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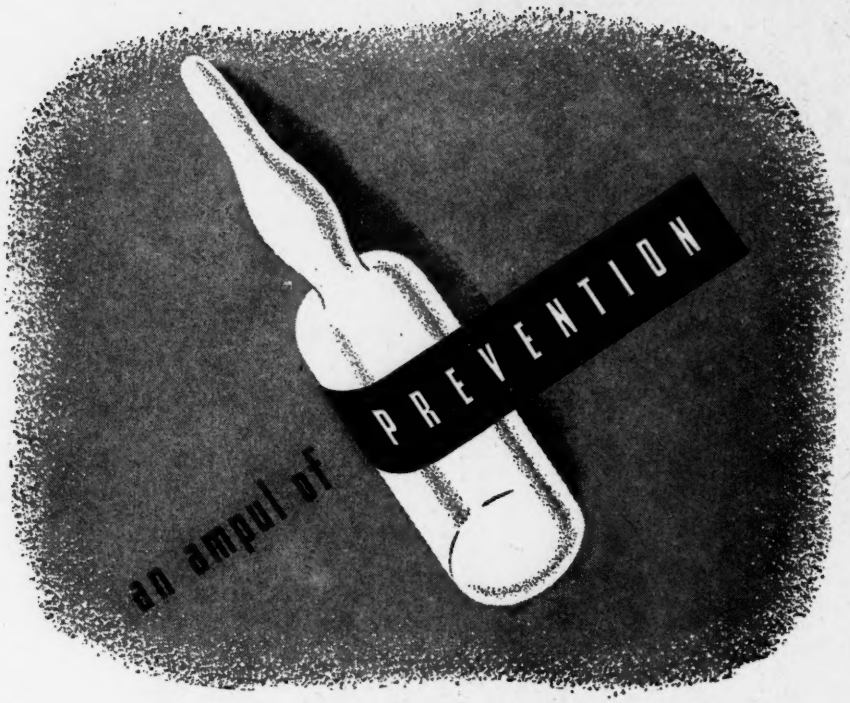

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Original Articles

A Clinical and Physiologic Evaluation of Vagotomy in the Treatment of Peptic Ulcer*†

I. F. STEIN, JR., M.D.** AND KARL A. MEYER, M.D.
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VAGOTOMY in the treatment of peptic ulcer has received widespread interest since the introduction of complete vagotomy by Dragstedt and Owens in 1943.[1] The previous literature has been reviewed [2, 3] and indicates that incomplete vagotomy is of little if any value in the treatment of peptic ulcer.

In June, 1946, a clinical and physiologic evaluation of vagotomy was started at the Cook County Hospital. Subsequently, vagus section was performed on 35 peptic ulcer patients.[4]

The patients selected for this study exhibited very severe ulcer diathesis, were from a low income group and often presented multiple complications. Such a group was chosen as a rigid test of vagotomy. There was a total of 53 previous complications in the 35 patients. Previous gastric surgery had been performed in 19 patients and the procedures included five gastric resections, five gastroenterostomies, and 16 instances of repair of a perforated peptic ulcer. Previous bleeding had occurred in 19 cases, 10 of which had massive hemorrhage, and 6 had pyloric obstruction, 3 of which were complete. Repeated attacks of severe epigastric pain were present in 31 of the 35 patients and in 12, the pain was intractable. The duration of symptoms ranged from 1 to 36 years with an average of 11 years. In all cases previous medical or surgical management had failed to give permanent relief of symptoms.

Duodenal ulcer was present in 26 patients and marginal ulcer in 8 patients. One patient had a prepyloric ulcer shown to be benign by biopsy at the time of closure of a perforation, two months before vagus section. This was the only gastric ulcer in the series.

* From the Hektoen Institute for Medical Research of the Cook County Hospital and from the Departments of Surgery of the Cook County Hospital and Northwestern University Medical School, Chicago.

† Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 29–Oct. 4, 1947.

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METHOD

The thoracic approach, as described by Dragstedt and Schafer [5] was employed in the first 9 cases. A 2 to 3-cm. portion of the nerves was resected approximately 6 cm. above the diaphragm. No attempt was made, however, to remove the distal branches of the vagi extending to or below the diaphragm as described by Dragstedt [5] and Moore.[6]

The abdominal approach as described by Dragstedt [7] has been employed in the remaining 26 cases and is preferred for the following reasons:

1. Exploration of the gastrointestinal tract allows examination of the viscera, for confirmation of diagnosis and for other intra-abdominal pathology.

2. The site of the ulcer may be examined and if marked scarring is present, a simultaneous gastroenterostomy is performed to prevent gastric retention.

3. The patients have a quicker convalescence and less postoperative discomfort.

4. The percentage of cases having incomplete vagotomy will not differ greatly whether the thoracic or abdominal approach is used, provided a careful search is made for all vagus fibers in the region of the diaphragm.[8, 9, 10]

CLINICAL RESULTS

In general, clinical results have been excellent. Following surgery, all patients had immediate relief of ulcer symptoms and pain. Thirty-one of the 35 patients are now leading an unrestricted life for the first time in many years. Ulcer management, including dietary and medical treatment, has been eliminated

completely. Satisfactory weight gain took place in 30, and 31 patients expressed themselves as being well satisfied with the results. The majority of patients had been constipated before vagotomy, whereas postoperatively, most of them had one or two soft bowel movements a day. Troublesome diarrhea occurred in two patients, but this disappeared spontaneously after two months. The most striking results, from the standpoint of complete relief of intractable pain, have occurred in 8 patients with marginal ulcer.

COMPLICATIONS

One patient died on the eighth postoperative day due to lower nephron nephrosis, uremia, and cardiac failure which followed a blood transfusion reaction. Recurrence of ulcer symptoms with positive x-ray evidence of peptic ulcer occurred in 4 cases. One patient developed acute gastric retention and dilatation on the tenth postoperative day which was treated effectively by gastric lavage followed by the administration of doryl.[11] This patient had a persistent, foul belching which lasted five months in spite of treatment with doryl or urecholine. These foul eructations have ceased and the patient is entirely asymptomatic.

In three patients, cardiospasm was noted about two weeks postoperatively. The dysphagia, substernal discomfort and regurgitation of food was spontaneously relieved in from one to three weeks.

One patient had loss of appetite with a failure to gain weight, and one patient had occasional vomiting. One patient, who had an excellent clinical result, was re-admitted to the hospital three months after vagus section with a bronchopneumonia from which he died. Autopsy showed the pneumonia to be unrelated to the previous vagotomy.

The most frequent and disturbing complication was gastric retention and distention, but this has been effectively controlled by the use of a gastroenterostomy if pyloric obstruction was present, by careful postoperative management,[4] and by the occasional use of doryl or urecholine.[11]

INSULIN TEST

Incomplete vagotomy is not expected to cause permanent healing of a peptic ulcer, and therefore each patient subjected to vagus section should be tested to ascertain whether the nerves have been completely sectioned. Insulin provokes increased gastric motility and secretion by hypoglycemic stimulation of the vagal center. This action is abolished by complete vagotomy. Our procedure is described in detail elsewhere.[3] The patient is fasted all night and the basal secretion and motility are determined in the morning for a period of at least one hour. Then 15 units of regular insulin are injected intravenously and the effect on gastric secretion and motility are noted for 1½ to 2 hours. Preoperatively, and postoperatively, if vagus section has been incomplete, there will be a sudden marked rise in free acid output following the hypoglycemia, and spontaneous or insulin induced hunger contractions will be present in the fundus of the stomach. After complete vagotomy there will be no acid response following insulin hypoglycemia and no spontaneous or insulin induced contractions in the fundus of the stomach. Of 30 patients tested by this method, 5 had incomplete vagus section, 2 were doubtful and one had return of vagal function after nine months—a total of 8 having doubtful or incomplete vagotomy. Four of these patients have had recurrence of ulcer symptoms.

CHANGES IN GASTRIC FUNCTION

Studies of gastric function were made on the majority of the patients before and after vagotomy, and have been reported in detail elsewhere.[12] The preoperative average of the 12-hour night secretion of 70 determinations in 22 patients was 47.4 milliequivalents (mEq) of free acid per 12 hrs. (Table 1). After complete vagotomy the average of 51 determinations of the night secretion in 18 patients was 1.9 mEq/12 hrs. This is a decrease of 96 per cent. The basal secretion was determined after 16 hours of fasting. The stomach was aspirated continuously and samples of gastric juice collected at 15-minute intervals for titration. (This fractional method of gastric analysis was also used in the insulin, histamine and caffeine tests.) The preoperative average of 56 determinations of the basal secretion in 22 patients was 3.7

TABLE 1. 12-HOUR NIGHT SECRETION AND BASAL SECRETION BEFORE AND AFTER COMPLETE VAGOTOMY

	Free Acid		Decrease Per Cent
	Before	After	
12-hour night secretion	47.4 mEq/12 hr. (70 determinations in 22 patients)	1.9 mEq/12 hrs. (51 determinations in 18 patients)	96
Basal secretion	3.7 mEq/hr. (56 determinations in 22 patients)	0.2 mEq/hr. (41 determinations in 18 patients)	94.6

mEq/hr. (Table 1). Following complete vagotomy the average of 41 determinations in 18 patients was 0.2 mEq/hr. This is a decrease of 94.6 per cent.

determined in 12 cases (Table 2). The average secretory response was 7.2 mEq/hr. before surgery and 1.0 mEq/hr. after complete vagotomy, a decrease of 86 per cent. All 12

TABLE 2. EFFECT OF HISTAMINE AND CAFFEINE ON GASTRIC SECRETION BEFORE AND AFTER COMPLETE VAGOTOMY

	Free Acid		Decrease Per Cent
	Before	After	
1.0 mg. histamine (average of 11 patients)	12.7 mEq/hr.	3.6 mEq/hr.	72
0.5 Gm. caffeine with sodium benzoate (average of 12 patients)	7.2 mEq/hr.	1.0 mEq/hr.	86

The effect of histamine on gastric secretion was tested on 11 patients (Table 2). The average secretory response to a 1.0-mg. intramuscular injection of histamine was 12.7 mEq/hr. before surgery and 3.6 mEq/hr. after complete vagotomy, a decrease of 72 per cent. All 11 cases of complete vagotomy tested showed a decreased secretory response to histamine, and an achlorhydria was present in two cases.

The secretory response of the stomach to 0.5 Gm. of caffeine with sodium benzoate, administered in water by stomach tube, was

cases of complete vagotomy tested showed a decreased secretory response to caffeine and an anacidity following caffeine stimulation was present in 3 patients.

The spontaneous motility of the fundus of the stomach was studied after 16 to 24 hours of fasting.[3, 11] A balloon was placed in the fundus of the stomach and a small amount of air was injected. Recordings were made by means of a water manometer on a slowly moving kymograph. Twenty-seven patients were studied before surgery and in each case spontaneous hunger contractions were noted.

Occasionally hypermotility was noted, as demonstrated by increased frequency and amplitude of the contractions. Following surgery in 24 cases of complete vagotomy, tonus rhythm was present but there were no spontaneous hunger contractions in the fundus of the stomach. After incomplete vagotomy in three cases, either spontaneous or insulin-induced hunger contractions were present.

DISCUSSION

The early complications of vagotomy, such as delayed gastric emptying, gastric dilatation or retention and cardiospasm are easily controlled and do not detract from the value of vagotomy in the treatment of peptic ulcer. In general the early clinical results have been excellent. Nevertheless, two important questions must be answered before vagotomy can be unreservedly accepted for the treatment of peptic ulcer:

1. What percentage of cases will have recurrence of peptic ulcer over a period of years?

2. Are the changes in gastric function permanent following complete vagotomy? If so, will there be late sequelae due either to changes in gastric function or changes in other organs innervated by the vagi?

Theoretically, recurrence may be explained either by failure to resect all the vagus fibers, regeneration of the vagi, or by factors unrelated to vagus nerve section. In our series there were 6 cases having definite incomplete vagus section, including one case of possible regeneration of the vagi. Four of these patients, or 11 per cent of the total, have had a recurrence with positive x-ray evidence of peptic ulcer within a year. The late recurrence rate for large groups of patients from various clinics has not been reported as yet.

Gastroenterostomy has a very limited place in the treatment of peptic ulcer because of the high incidence of postoperative gastrojejunal ulcer. Incomplete vagotomy and gastroenterostomy may result in similar gastrojejunal ulceration.

The permanency of the altered gastric function following complete vagotomy is not yet certain. Vanzant reported that two years following vagotomy in the dog, gastric acidity returned to near normal.[13] The late effects of complete vagotomy on the gastric secretory and motor mechanisms in man are not yet certain. The early or late effects of vagotomy on the function of the liver, gallbladder, pancreas, ampulla of Vater, duodenum, small intestine, adrenals and kidneys are not yet definitely known.

The early changes in gastric function following vagotomy provide evidence for a reappraisal of the present concept concerning the relationship of the vagus nerves to gastric function. The secretory activity of the stomach has been divided into the period of interdigestive or continuous secretion and the digestive period of secretion. The latter consists of three phases: cephalic, gastric, and intestinal.[14, 15]

I. Interdigestive Period
   1. Vagal factors—95 per cent.
   2. Other factors.

II. Digestive Period
   1. Cephalic phase—100 per cent vagal.
   2. Gastric phase — partially dependent upon vagus function.
   3. Intestinal phase—probably influenced by vagus function.

Gastric secretion during the interdigestive period may be due either to humoral or nervous factors, or to both. Dragstedt has stressed the possibility that the hypersecretion of duodenal ulcer patients is due to constant excessive activity of the gastric secretory fibers in the vagus nerves.[16] The marked diminution of the night secretion and the basal secretion following complete vagotomy indicates that the vagus is the most important factor contributing to gastric secretion during the interdigestive period. The secretion of acid during this period is not abolished by complete vagotomy, thus the vagus is not the only factor concerned.

The cephalic phase of gastric secretion is mediated entirely by the vagi. The gastric phase of secretion can be provoked by mechanical stimulation and secretagogues, and had been considered independent of the vagus. In view of the marked decrease in the secretory response to histamine and caffeine following complete vagotomy, it is ap-

parent that the gastric phase of secretion is to some extent influenced by the vagi.

The beneficial results of vagotomy in the treatment of peptic ulcer cannot be attributed to any single change in gastric function; both periods and all phases of gastric secretion are either partially or completely dependent upon vagus function as is the motor mechanism of gastric hunger contractions. The fact that complete vagotomy is followed by immediate relief of ulcer symptoms, and apparent healing of the ulcer, does not prove that excessive vagal activity is the cause of peptic ulcer. Complete vagotomy interrupts a mechanism necessary for chronicity of peptic ulceration, although this mechanism may not be primarily disturbed.

SUMMARY

Thirty-five peptic ulcer patients have had vagus section and have been followed clinically from 5 to 16 months. Clinical results have been excellent except in 5 cases including one postoperative death and 4 recurrences of peptic ulcer. There are marked changes in the gastric secretory and motor mechanisms following complete vagotomy. It is not certain to what extent this altered gastric function is permanent. Little is known of the effect of vagotomy on the other organs innervated by the vagi.

It is still too early to make a final evaluation of vagotomy in the treatment of peptic ulcer. Until more information is available concerning the incidence of recurrence of ulcer distress and the possible late sequelae, the use of vagotomy should be limited to clinical investigation with one exception. Complete vagotomy is the method of choice in the treatment of marginal ulcer following gastric resection.

SOMMAIRE

Trente-cinq malades avec ulcères peptiques ayant été soumis à une section ou vagus ont été suivis cliniquement de 6 à 16 mois. Les résultats cliniquax furent excellents exceptés dans 5 cas qui donnèrent un décès postopérative et 4 recidives ulcères peptiques. Il y a des changements marqués de la secretion gastrique et dans le mécanisme gastrique après une vagotomie. Il n'est pas certain si cette alteration des fonctions gastriques soit permanente. Il est encore trop tôt pour faire une évaluation finale de la vagotomie dans le traitement des ulcères peptiques, avant que nous soyons plus renseignés sur la fréquence de la récidive. La vagotomie complète est la méthode de choix dans le traitement des ulcères marginaux suivant la resection gastrique.

RIASSUNTO

La statistica operatoria degli AA. comprende trentacinque casi di ulceri peptiche sottoposti a resezione del vago, seguiti per un periodo di tempo oscillante da 5 a 16 mesi. I risultati clinici sono stati ottimi, ad eccezione che in 5 casi. E cioe': 1 caso di morte per complicazioni post-operatorie, e 4 recidive. Molte variazioni, motorie a secretorie, occorrono nello stomaco dopo una completa vagotomia.

Non siamo ancora in grado di stabilire la durata di queste variazioni. Poco sappiamo inoltre sopra gli effetti della vagotomia negli altri organi innervati dal vago.

E' ancora presto per definire con esattezza un'indicazione precisa della vagotomia nella cura delle ulceri peptiche. Fino a che non saremo in possesso di maggiori dati statistici reguardo la recidiva dei sintomi gastrici ed altri eventuali inconvenienti post-operatori, e' prudente limitare la vagotomia ad un controllo clinico. La vagotomia rimane pero', fin d'ora, un intervento di elezione nei casi di ulceri marginali successive a resezioni gastriche.

SUMARIO

35 casos de ulcera peptica tratados por la sección del nervio vago han sido estudiados clinicamente por un periodo de 5 a 16 meses. De estos casos, 30 han obtenido muy buenos resultados, uno fallecio despues de la operación y los otros cuatro presentaron una reactivación de la ulcera.

La vagotomia produce grandes cambios en la función gastrica. Aun todavia no se puede predecir la permanencia de las alteraciones funcionales resultantes. Poco se sabe de los efectos de la vagotomia en los organos vecinos que son inervados por este nervio.

Todavia aun es muy prematuro el tratar de hacer un juicio final de este metodo de trata-

miento y por lo tanto debe considerarce por el momento como un metodo de investigación clinica. Sin embargo se puede decir que es el metodo de selección en el tratamiento operatorio de las ulceras marginales que ocurren como complicación de las resecciones gastricas.

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The Intervertebral Disk Syndrome*

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THE intervertebral disk has been the object of study for several centuries. In 1555 Vesalius described the difference between the consistency of the annulus fibrosus and that of the nucleus pulposus. Virchow made anatomic studies of the intervertebral disk in 1857, and one year later von Luschka accurately described its structure and embryology. Between 1855 and 1880 various writers made contributions to the embryology, stressing the importance of the fetal notochord.

In 1927, Schmorl began his meticulous necropsy studies showing the high incidence (38 per cent) of displacement of the nucleus pulposus into the spongiosa of the vertebral body. Schmorl and Andrae also called attention to the cartilaginous masses found within the spinal canal, consisting of nucleus pulposus herniated through defects in the annulus fibrosus. The modern concept of the syndrome of protrusion of intervertebral disk dates from the work of Mixter and Barr, Adson, Love, Craig, Camp, Walsh, Dandy, and Bradford and Spurling.

The first case of intervertebral disk herniation to be described clinically was that of Kocher in 1896. Since 1934 a voluminous literature on the subject has accumulated.

The first published report of a patient operated on for protrusion of an intervertebral disk into the spinal canal was that of Oppenheim and Krause in 1909. Their patient had a complete transverse lesion of the cauda equina at the level of the third lumbar disk. The protruded portion of a disk was removed at operation and the patient recovered. Middleton and Teacher in England, and Goldthwait in the United States reported cases in 1911. Adson performed his first operation for this lesion in 1922. Numerous reports of "enchondromas" appeared between 1911 and 1929. In the latter year Dandy reported 2 lumbar cases and recognized the distinct character of the lesion. Peet and Echols also recognized the lesion about the same time. Schmorl recognized the frequency of protrusions from the disk margins but did not consider them of great neurologic significance.

The interest of Mixter and Barr was aroused in 1932 by the case of a young man with severe intractable sciatica following a fall. They found that about 75 per cent of their enchodromas were not tumors but protrusions of normal disk cartilages. In 1934, they called attention to the fact that unilateral leg pain was the outstanding symptom suggesting a protruded disk. It is remarkable how close many investigators came to discovery of the disk syndrome. This is especially true of Danforth and Wilson and Williams, Ghormley, Putti, Adson, Dandy, Bucy, Goldthwait, Barr and others.

The nucleus is capable of absorbing 16 times its weight of fluid.

VENTRAL EXTRADURAL CHONDROMAS

Formerly, small localized masses extending into the ventral part of the spinal canal opposite the intervertebral disks were considered true neoplasms and were designated by various terms: chondroma, ecchondrosis, fibroma, and fibrochondroma.

Two "chondromas" of the lumbar intervertebral disks were reported by Ott and Adson (1923). In 1928, Elsberg reported 11 "chondromas" involving intervertebral disks, and Stookey reported 7 cases, all cervical. Alajouanine and Petit-Dutaillis recognized that these "chondromas" consisted of the displaced nuclei pulposi of the intervertebral disks. The report by Elsberg of 15 patients with "chondromas" proves the similarity between certain parts of the intact intervertebral disk and the "chondroma." Kocher (1896) recorded the first account of traumatic rupture of the intervertebral disk.

Middleton and Teacher (1911) reported

* Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 29–Oct. 4, 1947.

the case of a patient who lifted a weight without suffering much distress, but later the same day experienced pain in his lower extremities followed by flaccid paraplegia. Examination revealed anesthesia up to the inguinal ligaments, absent knee and ankle jerks and incontinence of both sphincters. The patient died 16 days later. Opposite the intervertebral disk between the twelfth thoracic and the first lumbar vertebrae was found a mass of the pulp of the intervertebral disk which had been displaced into the vertebral canal. In the same year Goldthwait (1911) produced excellent theoretical arguments to prove that as a result of trauma, the substance of the intervertebral disk might cause compression of the cauda equina. He made this diagnosis in a patient with motor, sensory and sphincter paralysis. Exploration by Harvey Cushing revealed only a narrowing of the osseous canal at the lumbosacral junction. The history was so characteristic that it appears quite probable that a ruptured disk was overlooked (possibly a concealed disk).

Dandy in 1929 reported 2 cases in each of which loose cartilage from an intervertebral disk caused compression of the structures within the spinal canal. He thought that the entire posterior part of the intervertebral disk was separated and displaced rather than that the nucleus pulposus composed the greater part of the mass.

By intimate cooperation between neurosurgeons and orthopedic surgeons, a new chapter in the etiologic diagnosis of sciatic pain has been written. In 1934, Mixter and Barr demonstrated that root compression as a result of pathologic changes in the intervertebral disk was a common cause of severe sciatic pain. In addition, they called attention to the true nature of the "chondromas" and the role played by the nucleus pulposus in these lesions. Prior to this important contribution the diagnosis of ruptured intervertebral disk could be made only at operation. Moreover, the lesion usually was mistaken for a neoplasm. Spines were explored only when the symptoms and findings were those of spinal cord tumor. Mixter and Barr deserve the credit for calling attention to the presence of ruptured disks in many cases of severe back and sciatic pain with but meager neurologic findings. This new syndrome was discovered through the integration of the knowledge accumulated by several investigators. Dandy claims that intervertebral disk protrusion has become the most frequent lesion encountered by neurosurgeons.

Iodized oil is a permanent deposit in the subarachnoid space (unless removed subsequently) and passes freely into the fluid-containing spaces in the cranial chamber. It is a matter of serious concern, even though there is no absolute proof that it does actual harm. Its presence is a good pretext for medicolegal action, particularly if no disk is found at operation.

In 1937 Reichert first substituted air for iodized oil as a contrast medium and in 1939 reported 35 cases with excellent diagnostic results. Air shadows are by no means so striking as iodized oil shadows.

The next diagnostic advance was made by Semmes who reported 16 cases that were diagnosed solely by history and neurologic examinations without any contrast medium whatever.

PATHOLOGIC CHANGES IN DISKS

Intrinsic disk lesions include traumatic, degenerative and infectious conditions, which have been described by Ghormley. In a typical clinical case of ruptured intervertebral disk, a large part of the tumor is composed of nucleus pulposus. The presence of portions of the annulus fibrosus in this mass does not alter the fact that the presence of nucleus pulposus is the cardinal observation. Bradford and Spurling refer to this entity as "rupture of the annulus fibrosus with posterolateral or posterior herniation of the nucleus pulposus." Other terms used are "rupture of the intervertebral disk" and "herniation of the nucleus pulposus," protrusion and extrusion.

CONCEALED DISK SYNDROME

In one publication Dandy discussed a variation of the lesion which he called a "concealed disk." A concealed disk is one in which a forceps may drop into the substance of the disk through a small opening. (A forceps cannot sink into a normal disk.)

A concealed disk is one that protrudes so slightly that it can hardly be found at operation unless the subdural region is explored with great care. Concealed disks make up more than 25 per cent of the total cases. Symptomatically there is no difference in the manifestations, but at operation the detection of the lesion is more difficult. Furthermore, the most important reason for avoiding spinal contrast mediums is that a concealed disk does not show a filling defect.

Uebermuth stated that "gynecologic backache" may be the result of changes in the intervertebral disks.

MECHANOGENESIS OF DISK LESIONS

Intervertebral fibrocartilaginous disks protrude posteriorly into the spinal canal as the result of unusual stress or strain applied to the vertebral column. The stress may be the result of a single outstanding injury or the result of repeated injuries of varying degrees of severity.

There has been considerable controversy concerning the mechanism of injury. Some authors believe the disk is more apt to be protruded when the spine is in flexion, and others think it is more vulnerable in extension. The discussion hinges around the relaxation or tautness of the posterior spinal ligament. There is no doubt that when the spine is flexed, the nucleus pulposus is driven backward, but at the same time the posterior spinal ligament is stretched and made taut because the posterior space occupied by the intervertebral disk is increased.

Friberg believes that during life it should be assumed that the nucleus must degenerate before it ruptures, unless the intervertebral disk has been subjected to unusual violence. He believes further that extremely strong pressure, sufficient to enter the bony substance, is a prerequisite to protrusion of the annulus fibrosus. If the whole nucleus pulposus or a part thereof is loosened, the detached portion alone protrudes. He makes the statement that the intervertebral disk in the intervertebral space exposed by operation, was on the whole unchanged. That is, the space was not narrowed, despite the fact that operation had revealed perforation of the annulus fibrosus through to the nucleus pulposus, and that large portions of the latter had been removed.

Several years ago Schmorl connected some of the disturbances of the intervertebral disk with the insertion of the posterior longitudinal spinal ligament. This ligament adheres to the vertebral body by only a few thin fibers, while its main fibers adhere to the intervertebral disk. It spans like a bridge the slightly retracted posterior surfaces of the vertebrae. Owing to this, no abnormal traction can act on the ligament and no abnormal ossification can occur. Larger ossifications protruding into the front of the vertebral canal are seen in the lateral roentgenograms as posterior spurs. Schmorl's nodules (herniated disk tissue) originate in the intervertebral disks. In addition, ossifications of the ligamenta flava or marginal dents of the smaller vertebral joints may protrude from behind into the vertebral canal.

SIGNS AND SYMPTOMS

Not all disk prolapses produce symptoms of sciatica nor are all sciatic troubles due to disk protrusions. The most common symptoms and signs and those which are of the greatest value in arriving at a clinical diagnosis of protrusion of a lumbar disk are unilateral sciatic pain, which occurred in 78 per cent of Love's cases, and bilateral sciatic pain, present in 16 per cent. In the other 6 per cent, backache alone or extension of pain elsewhere than along the course of the sciatic nerve occurred. Pain which interfered with sleep at night was complained of by 24 per cent of the patients. This is an important symptom when present. It is particularly suggestive of a lesion of a nerve root, but it is much more common in cases of intraspinal neoplasm than in cases of protruded disk. Another indication of involvement of a nerve root or of a radicular type of pain is accentuation of the pain on coughing, sneezing or straining at stool. Such accentuation occurred in 64 per cent of Love's cases. Paresthesias in the dermatome supplied by the compressed nerve root are of value in the diagnosis and localization of the protrusion. Paresthesias occurred in 50 per cent of Love's cases. On the other hand, sphincteric disturbance occurred in only 4

per cent. When such disturbance occurs, it usually means that a very large lesion is present, producing a complete subarachnoid block, which commonly is not associated with protruded disk.

One characteristic of the course of the intervertebral disk syndrome is its variability, which is characterized by intermittence of symptoms.

I had one patient who found that by punching his right buttock he was able to reproduce his pain on the right side, whereas punching his left buttock caused no pain. He had a right-sided protrusion of the fourth lumbar disk. This is the reverse of the Queckenstedt test. It is a test that is worthy of performance but should not be given too much prominence. If it is positive it is confirmatory evidence.

I have been able to localize many lesions by giving the patient a pinch of snuff to cause a sneeze or two which exaggerates his pain.

In an analysis of 500 consecutive cases in which operation was performed for protrusion of one or more intervertebral disks, Love and Walsh found that 58 per cent of the patients gave a history of a specific injury to the back. Analysis of their series of cases reemphasizes the point to which Love and Walsh have called attention previously, that a high percentage of patients give a history of intermittency of symptoms. Eighty-four per cent of their 500 patients had intermittent symptoms. Whether this intermittency is due to vascular changes in the protruded portion of the disk, as suggested by Deucher and Love, or to degeneration and interruption of pain fibers as a result of compression of the nerve root by the protruded body, as suggested by Adson, or to a return of the protruded fragments to within the center of the intervertebral space, is not known. Intermittency is a characteristic finding and serves as a useful criterion in distinguishing between root pain caused by a protruded disk and that caused by an intraspinal neoplasm, which usually is characterized by definite progression of symptoms and signs without remissions.

All of Verbrugghen's patients operated on had sciatica; 75 per cent had low back pain; 90 per cent had intermittent symptoms; only 62 per cent had a history of trauma; 80 per cent, however, had pain on coughing and sneezing, and 65 per cent had various kinds of numbness and tingling in the outer border of the leg and foot. The most common finding was a positive Lasègue sign, which occurred in 82 per cent and was associated with a tender spine in 82 per cent of the cases. There was some interference with the ankle jerk on the affected side in 77 per cent, changes in sensation in the foot and leg were observed in 70 per cent and roentgenologic changes were observed in about 25 per cent. Changes in the spinal fluid were noted in 50 cases, of which 45 had a total protein of over 40 mg. From the study of the spinal fluid alone, one was able to say that a good result could be anticipated if there were raised total protein. Contrast media were used in the beginning (lipiodol), but later air was substituted. Now air is used exclusively, but only in atypical cases to confirm the diagnosis.

From the large number of patients with varying degrees of back and sciatic pain, a small proportion have both back pain and pain throughout the sciatic distribution. The pain is intractable to conservative measures and there have often been previous attacks. There are definite but often inconspicuous neurologic findings.

Mild cases of herniated nucleus pulposus are more prone to remissions and therefore may not call for surgical treatment. The surgical treatment of herniated nucleus pulposus is fundamentally a procedure to relieve pain.

In spite of the fact that many patients with severe persistent sciatic and back pain recover spontaneously without the aid of surgery, there is a large group who improve but do not fully recover. In 1906 Camus and Sezary reported a case which from the history and findings was in all probability due to herniation of the nucleus pulposus. Seeing the same person in 1911 Dejerine said, "Son etat est toujours le meme." Many patients who have suffered, year after year, from intractable sciatic pain without showing evidence of a progressive lesion probably have had ruptured intervertebral disks with herniation of one or more nuclei pulposi.

Since the herniated nuclei pulposi compress

the spinal nerves near their only exits from the spinal canal, it is logical for the radicular neurologic findings to localize the lesion. The predominance of these lesions at the fourth lumbar and lumbosacral disks simplifies the problem of localization. If only those patients who are incapacitated by involvement of the components of the sciatic nerve are selected for operation, relief of symptoms can be promised uniformly. Recurrence of the pain and disability after the patient has resumed active labor is a real possibility.

No lesion can assume much size in the cervical or thoracic regions of the spinal canal without interrupting some nerve pathway and thus calling attention to a compressive lesion. In the lumbar region, however, a mass may be fairly large before any conduction system is affected. Friberg made the experimental observation that herniations up to 8 by 8 by 8 mm. may lie lateral to the dura and nerve root without producing a demonstrable filling defect in the myelogram.

LOCALIZATION OF INTERVERTEBRAL DISK DISTURBANCES

Protrusion of any intervertebral disk may occur but in the vast majority of cases the displacement occurs in the lumber region of the spinal canal. Approximately 96 per cent of Love and Walsh's 500 patients had lumbar protrusions. There is a very high incidence of protruding disks at the fourth and fifth lumbar interspaces; 96 per cent of all the lesions are found at the fourth and fifth lumbar disks and they are fairly evenly divided. Protrusions in the cervical and thoracic regions of the spinal canal, because of the limited space between the spinal cord and the bony canal, resemble more closely intraspinal neoplasms. Usually they are detected more promptly than those in the lumbar region, where the cauda equina has more freedom of movement.

In 1919 Dandy introduced air into the spinal canal. In 1922 Sicard and Forestier introduced lipiodol into the spinal canal. Chamberlain employed oxygen or air myelography. Spurling introduced Pantopaque, which is immediately removed by aspiration.

DIAGNOSIS

The most important diagnostic question is, "Are we dealing with a disk syndrome?" The second question is, "Where is the trouble located?"

The diagnosis of a ruptured disk and its location usually can be made solely by the history and examination, and by so doing one relieves the patient of discomfort and possible after-effects. Not even a lumbar puncture is always necessary.

Our present concept of this syndrome was established through the evolution and utilization of the knowledge accumulated by many neurologists, neurosurgeons and orthopedic surgeons.

If a person is awakened from sleep by pain in his back which is improved by change of position, it indicates a mechanogenic lesion, and the diagnostician has presumptive evidence of a space-occupying lesion in the spinal canal. The pinch test is performed by strongly pinching the skin and comparing the sensation with that following stroking with cotton. Some authorities run a hypodermic needle through the anesthetic skin. Others run a safety pin through the skin and clasp it in position. This impresses the patient very strongly. Occlusion of both jugular veins until the face is flushed and the head feels full aggravates the pain in the leg and the paresthesia (Naffziger). Lewin proposed the artificial fever test. Hyperpyrexia will not help a disk syndrome but will strikingly improve a comparable pain due to arthritis, fibrositis or muscle spasm.

Since over 96 per cent of all protruded lumbar vertebral disks are at the fourth and fifth lumbar spaces and since the unilateral approach is adequate to find the lesion whether it is at the fourth or fifth disk, it remains only to make the diagnosis of a protruded lumbar vertebral disk in order to disclose its location and remove it.

How can the diagnosis of a ruptured vertebral disk at the fourth and fifth lumbar interspaces be made with assurance? The diagnosis is made on low midline lumbar backache plus pain down the back of one or both legs, the pain is intensified by coughing and sneezing and the pain must be recurring and not continuous. There may or may not be diminution of the Achilles tendon reflex or sensory or motor loss in the distribution of

the fourth or fifth lumbar or first sacral nerves.

An overwhelming percentage of protruded vertebral disks can be diagnosed and localized by the history and examination alone, and all accessory diagnostic tests can and should be avoided wherever possible.

In cases of protrusion of a disk at the third lumbar level, the pain will be localized to the front of the thigh instead of the back of the leg.

The three neurologic signs which are most helpful in the diagnosis of protrusion of a lumbar disk are: Lasègue's sign, sciatic nerve tenderness, and diminution or absence of the Achilles tendon reflex on the side of the pain.

Mixter and Barr deserve the credit for calling attention to the presence of ruptured disks in so many cases of severe back and sciatic pain with but meager neurologic findings. The diagnosis may be suspicious, presumptive, probable or positive. The percentage of error in diagnosis of the presence of a protruded intervertebral disk and its location should be very small, in experienced hands. Usually it is more harmful to withhold than to perform an operation.

Dandy claimed that the diagnosis of a ruptured disk could be made solely from the patient's story of low backache plus sciatica, occurring in attacks, usually after a relatively trivial injury such as a lift, bend or strain. Since the diagnosis can be made with accuracy by the clinical symptoms alone, lumbar punctures, injection of contrast mediums into the spine are unnecessary.

DIFFERENTIAL DIAGNOSIS

There are only three or four other lesions that can give symptoms of backache and attacks of sciatica fairly similar to those caused by a protruded disk: (1) tumors of the cauda equina; (2) congenitally defective fifth lumbar vertebra with destruction of the articular processes; and (3) spondylolisthesis. All of these are relatively uncommon. The last two can be differentiated by the roentgenogram. Spinal tumors usually will give some sensory or motor disturbances in addition.

Occasionally disks are encountered at the second or third lumbar interspaces but the symptoms are sufficiently different (usually pain in the front of the leg or diminution of the patellar reflex) to suspect a lesion at a level higher than the usual one.

With the characteristic pain in the lower lumbar region and down the hip and back of one or both legs, the affected disk therefore is nearly always at the fourth or fifth lumbar, and it has been necessary to explore only one or both of these disks. Frequently there is a clue, such as a reduced or absent Achilles tendon reflex, which points to the fifth, although it may also exist with one at the fourth.

If the diagnosis is questionable, an exploration of the region is preferable to spinal injections of air or iodized oil.

PROGNOSIS

The prognosis of disk injuries under conservative management is always uncertain because of the probability of recurrent attacks of backache, accompanied by sciatic radiation pain. The outlook following an accurate diagnosis in uncomplicated cases, and an early appropriate operation, is excellent. The results depend to a consdierable degree on the question of compensation and litigation.

Many cases of sciatica present a characteristic syndrome which can be relieved by surgery. The disk syndrome accounts for an overwhelming percentage of the "heretofore incurable and untreatable" low back pains and sciaticas, sacroiliac strains and arthritis of the spine.

Treatment should not be started until after a complete history has been taken, and physical, neurologic and roentgenologic examinations have been performed. Even when the tentative diagnosis of posterolateral herniation of the nucleus pulposus has been made, nonsurgical treatment should be tried.

I have seen practically all gross symptoms completely disappear under conservative treatment. Also I have seen the Achilles and patellar reflexes return during the course of conservative treatment. But every one of these patients had definite "hangover" symptoms and would have been better off if he had been treated surgically.

The situation is remarkably analogous to that which obtains in cases of internal de-

rangements of the knee joint where locking, limp, pain and limited movement disappear but the knee remains vulnerable to moderate stresses and strains, precludes athletics and combatant military service.

Previous objections to the treatment of these cases were: the use of lipiodol which was irritating and was objectionable to industrial commissions; and laminectomy, which might weaken the back. Now that these two objections have been overcome, the back is not weakened, and the patient's stay in the hospital is strikingly reduced.

Many writers advise spinal fusion following removal of a ruptured disk, some almost routinely, others largely in industrial cases, in which heavy work must be resumed. Where compensation is a factor, a fusion will not diminish the complaints and in cases with hard labor ahead, a rest of three months is probably adequate protection.

At the Mayo Clinic the neurosurgical staff has operated for protruded intervertebral disks in more than 1600 cases. By means of detailed studies of these cases, the neurologists, orthopedists, roentgenologists and neurosurgeons have come to recognize a protruded disk syndrome, and the accuracy of diagnosis, which is founded on the history and clinical and roentgenologic findings, is extremely high. The therapy, likewise, gives excellent results with a mortality rate in surgical cases of less than 0.25 per cent.

TREATMENT OF THE DISK SYNDROME

The treatment of the disk syndrome includes the nonoperative, operative and postoperative measures.

Conservative Treatment. Love and Walsh urge a trial period of conservative treatment, unless there is gross evidence of damage to the central nervous system before undertaking surgery for the relief of pain in the neck, shoulders, back, or lower extremities. A period of observation and conservative treatment usually will indicate whether there is an underlying lesion of the spinal cord or of a nerve root which must be relieved surgically.

Operative Treatment. Three important advances have improved and greatly simplified the operative treatment. Originally a bilateral laminectomy was performed and the disk was removed intradurally. Mixter and Barr removed the disks extradurally by the bilateral approach. Semmes and also Love in 1939 reported their removal by hemilaminectomy and by removing only a notch of bone from a lamina. Love in 1940 removed a high percentage of ruptured disks through the interlaminal space without removing any bone. His technic is the acme of perfection, but can be accomplished only when the space between the laminae is of sufficient size. Love introduced his precision operative technic of exposing and removing many disks without sacrificing any bone.

Precision Aids in Localization. There are precision tests in localizing troublesome intervertebral disks and determining the specific vertebrae involved. These should be reviewed in every case the day before operation. In addition, on the day before operation 1 cc. of methylene blue should be injected into the skin at the level of fourth lumbar intervertebral disk and expose a lateral roentgen film. The films should be in the illuminated box in the operating room during the operation. This marker is of great aid in localization during the operation.

Anesthesia. Many surgeons prefer local anesthesia for the preliminary stages of the operation. When the affected spinal nerve is located and the offending disk is discovered, a change is made to a general anesthetic; usually a gas anesthetic, only for the highly technical part of the operation.

The control of hemorrhage is accomplished by: adrenalin in the local anesthetic; sponges of various sizes and shapes; electrical coagulation; silver clips and small pieces of muscle (like postage stamps) under pressure sponges. Mechanical aspirators are indispensable in maintaining an unobstructed dry field. Lewin uses the two aspirator-retractor method to visualize the affected spinal nerve and the offending disk.

Disk Operations. There have been significant refinements in technic which permit more rapid operating with less hemorrhage, less shock and greater success. Efficient retraction is indispensable. Adequate deep illumination is imperative. Love's dura retractor and nerve retractor are very helpful. Spurling performs his operation under

local anesthesia. He does not do a complete laminectomy.

An intravenous infusion of dextrose in normal saline should be started as soon as the incision is made. Compatible blood should be at hand for immediate instillation if circumstances demand.

Just before operation make a short cross incision through the skin at the level of the interspace to be explored. If a long incision is to be made, several superficial scratch cuts can be made, to be matched up when the incision is finally sutured.

Suture towels to skin edges.

Love's Operative Technic. The anesthetic of choice is ether, which is best administered by the open drop method over the end of a Magill intratracheal tube, introduced after the patient has been anesthetized by nitrous oxide and oxygen. The patient is then placed on the operating table as for any laminectomy. (Love performs his cervical laminectomies with the patient in the upright position; but operations on other regions are performed with the patient prone, the torso being supported by two rolled pillows so that there is no interference with breathing.) When the lesion is low in the lumbar region or at the lumbosacral space, a large soft, flat pillow is placed across the lower ends of the rolled pillows and between the symphysis pubis and the xiphoid process, in order to increase the prominence of the lumbar spinous processes. This facilitates exposure in the lumbar region where the muscles are large and the distance from the skin to the anterior surface of the dura mater, or disk, is greater than at any other level of the spine.

Subperiosteal exposure of the spinous processes and laminae of the two vertebrae between which the protrusion has occurred, furnishes adequate exposure for removal of the disk. (Lewin has designed a special instrument for spreading apart the laminae, to facilitate removal of protruded intervertebral disks in those cases where the operation can be performed without removing any bone.) Occasionally the laminectomy necessarily is more extensive, but often only a portion of the lamina of one of the vertebrae needs to be removed. If the protrusion is lateral it may be necessary to remove the articulating facets on that side in order to secure adequate decompression of the involved nerve root. Whenever possible, laminectomy should be narrow and the facets should be preserved. This maintains normal stability of the spinal column following operation. In the cervical and thoracic regions, wide laminectomy, at least on one side, is the rule, for here the spinal cord must be rotated in order to obtain satisfactory exposure. Section of one or more teeth of the dentate ligament facilitates rotation of the cord.

Unilateral protrusions in the cervical region can be removed by hemilaminectomy. This is always preferable when one is dealing with intraspinal lesions in the cervical region, because the neck is left in a more nearly normal condition after operation. In spite of the free motion of the cervical spine, there is little or no danger of dislocation—a condition which does occur, although rarely, following bilateral cervical laminectomy.

The protruded disk may be removed extradurally or transdurally. The operation should be adapted to the particular case, after exposure has been made. If the protrusion has occurred to one side, Love prefers extradural removal. If the protrusion is in the midline, and particularly if the extruded mass is small, transdural removal is easier and is accompanied by less bleeding. If the dura is retracted for an anterior extradural approach to a small herniation of the disk, bleeding from the extradural vessels is likely to be profuse and very troublesome. Love finds that the extradural veins are either thrombosed or sufficiently displaced by the larger protrusions, so that they are not injured during the removal of the mass, and consequently the hemorrhage is less. Some of the protrusions are of bony hardness while others are soft and fluctuant. Fluctuant masses should be aspirated with a small needle to exclude the possibility of pus in a tuberculous lesion before the mass is incised, for to incise such a lesion in the presence of an open dura mater is fatal.

From the point of view of surgical anatomy, protrusions are of two kinds: (1) those that pop out when the dura mater is retracted and the thinned out posterior longitudinal ligament is incised, and (2) those that are

firmly adherent to the adjacent vertebrae and require sharp dissection for their removal.

At operation the protruded disk usually resembles a bald head or the little ball that is spun on a roulette wheel. The extruded portion of a protruded disk may look like a round yellow pea. The nerve is sandwiched between two firm objects. The mechanics of the relation of a protruded intervertebral disk and the spinal nerve indicates that the squeeze is being carried out by the protruded disk compressing the nerve against the dura, the ligamentum flavum or bone.

Some authorities advise vigorous curettage of the disk. Others recommend scraping vertebral spurs and posterior vertebral margins. I look upon the latter procedure as potentially harmful because it is analogous to removal of spurs from the os calcis which stimulates local osteogenesis.

Love keeps his patients in bed for from 12 to 14 days following operation, during which time they rest on soft pillows so arranged as to keep the spine straight. They are turned every four hours. The skin sutures, either silk or dermal, are removed on the tenth postoperative day. Catheterization is performed every eight hours if the patient is unable to void. If voluntary urination does not occur by the third day, an indwelling urethral catheter is inserted for continuous drainage of the bladder until the patient is out of bed. The indwelling catheter and the bladder are irrigated twice daily with a 4 per cent solution of boric acid, and 7½ gr. (0.48 Gm.) of methanamine and 15 gr. (1 Gm.) of ammonium chloride are given by mouth three times daily. Love believes this routine minimizes the danger of cystitis and infections of the urinary tract. The catheter is removed after five days and is replaced by another sterile catheter.

A common occurrence during operation is the sudden jumping of a thigh or leg when a lumbar spinal nerve is compressed during the operation. It is a very valuable danger signal.

After the Operation. There are several "stunts" used by various surgeons in the postoperative care of these patients. These include the split mattress, the Herzmark frame, and the Stryker frame. Others use no special apparatus but place the patient on his side on an ordinary mattress. The nursing care of the uncomplicated case is very simple, amounting to routine nursing care of all back patients.

THE QUESTION OF COMBINED OPERATION: REMOVAL OF DISK AND FUSION

When should fusion be used as a supplement to the removal of a protruded or concealed intervertebral disk? The neurologist leans far away from fusion. The orthopedic surgeon, in general, leans closely toward fusion. There are a few, however, who take a middle ground, these being the men who work in teams of neurosurgeons and orthopedic surgeons. Past experience with cases of chronic backache compels the orthopedic surgeon to be very cautious in advising against fusion. So many of these back cases are chronic and removal of a disk no matter how perfectly, leaves the person with a chronic, weak, inefficient, insufficient spine. It is unreasonable to expect the removal of the protruded disk alone to correct the back trouble.

The question of whether the fusion operation should be performed at the same time as the removal of the disk is important. I believe that most of the fusion operations should be done at a subsequent time rather than at the time the protruded disk operation is performed. If there are congenital anomalies and a long history of chronic back trouble, and the person is to return to heavy duty, a spine fusion should supplement the exploratory operation. The cases in which Macey employs the combined procedure of hemilaminectomy, removal of the disk and bone grafting, include such conditions as spondylolisthesis, separated neural arch without slipping of the vertebral body and marked narrowing of the intervertebral space with hypertrophic arthritic changes. At this point let me emphasize the importance of the intervertebral foramen and the articular facets which if destroyed or weakened will lay the groundwork for future mechanical trouble of serious degree.

The static type of back trouble and the chronic type of back trouble require a fusion operation. The history of the case, the physical examination, the roentgen-ray findings and

the occupation, determine whether a fusion should be performed. Each surgeon must decide for himself whether the combined operation should be done at one time or in two separate stages. If it is to be done in two stages the patient should be told before the first operation that a second one should be performed later.

The number of combined operations performed has increased during the years. In the year 1936 no combined operations were performed at the Mayo Clinic in cases of suspected protrusion of an intervertebral disk. In 1937, 1 per cent of the patients for whom laminectomy was performed also underwent a bone graft operation. In 1938, 6.5 per cent, in 1939, 14.8 per cent and in 1940, 14 per cent of the cases in which laminectomy was performed for suspected protrusion of an intervertebral disk, had bone grafting. The increase in this percentage is due not only to the fact that both neurosurgeon and orthopedic surgeon felt that some patients with protruded disk should undergo bone grafting, but also to the fact that in many cases in which the orthopedic surgeon had planned a bone grafting operation he asked that the neurosurgeon perform laminectomy so that it could be determined whether or not a protruded disk might be present. In the latter group they particularly refer to cases of spondylolisthesis, spondylolysis and the like.

It was their opinion that the surgeon could promise relief to the majority of patients with protruded intervertebral disks by removal of the protrusion alone. But it was also their opinion that there was a group of cases in which bone graft or fusion operation should be done to relieve most of the symptoms and to give the best result.

It must be borne in mind that the roentgenographic appearance alone is not the determining factor in cases in which combined operations are chosen. A careful review of the patient's history must be carried out and the symptoms must be analyzed. Patients who have a long-standing static type of backache and who have evidence of a superimposed protruded disk, whose pain is not relieved by rest, may be advised to undergo the combined operation.

In those cases where a combined operation is to be performed it should be done by two teams, if they are available: first, a neurosurgical team, and second, the orthopedic surgical team.

When a fusion is performed, the placement of the grafts is of great importance. It is imperative that the grafts be in contact with bone. Bilateral grafts, i.e., one on each side, using heavy grafts, is advisable. If the grafts are not in contact with bone, hemorrhage will float them apart and failure of consolidation is almost inevitable. It is important that a dry field be maintained because hemorrhage will jeopardize the fusion. There must be no slipping of any of the bone grafts because slipping will cause pressure on the dura and nerve pain. If the dura is opened and cerebrospinal fluid leaks out, it will "float" the grafts and jeopardize bone contact and subsequent fusion.

COMMENTARY ON THE DISK SYNDROME SITUATION

The characteristic symptoms and signs that we were taught as indicating the presence of a spinal cord tumor are being taken over bodily in diagnosing a disk syndrome (except for the intermittency of symptoms in disk lesions).

Some orthopedic surgeons say, "Wait till you see how many disk removal cases will need subsequent fusions."

Neurosurgeons say, "If you only knew the number of fused spines that should have had disk removals first."

How many disk-operated persons return for fusion?

How many fusion-operated persons return for disk operation?

How many disk-operated persons return for fasciotomy?

The diagnosis of a disk syndrome is likely to become an escape for inadequate diagnosis.

Compensation is a self-perpetuating mechanism producing invalidism. It is the perpetuation of symptoms for unconscious purposes.

A protracted disability enhances the original organic symptoms as a hysterical aftermath, used for escapist or other purposes.

Dandy claims that merely opening the traumatized disk effects the relief or cure.

Nachlas correctly asks, "What component of the operation produces the relief?" He adds, "There has, of course, been a moderate spine flexion under anesthesia. A 'stripping' operation is necessary for the exposure. The nerve root is frequently 'stretched' by the retraction." He wonders if a disk operation does not carry with it some of the elements of such other procedures as sacroiliac manipulation, exposure and stretching of the sciatic nerve, fasciotomies, and myotomies.

The dermatomes are very valuable in localizing an intraspinal lesion. Lesions involving the fifth lumbar nerve disturb the sensation of the skin over the top of the great toe and a strip up the foot and leg. Lesions involving the first sacral nerve disturb the sensation of the skin over the dorsum of the foot. Lesions involving the second sacral nerve affect the lateral aspect of the leg.

SOMMAIRE

Les symptômes caractéristiques qu'on a enseignés indiquant la présence d'une tumeur de la moelle épinière sont discutés et étudiés afin de faciliter le diagnostique du syndrome du disque, excepté l'intermittence des symptômes provoqués par lésion du disque. De certains chirurgiens orthopédiques nous disent "attendons pour voir combien de cas du disque demanderont une fusion subséquente." Les neurochirurgiens nous disent si seulement nous savions combien de cas de fusion de vertèbres auraient dû être procédés de l'ablation due disque. Combien de personnes opérées pour une fusion reviennent pour une opération du disque? Combien de personnes operées du disque reviennent pour une fasciotomie? Le diagnostique du disque syndrome cache un diagnostique incomplet. La compensation est un mécanisme qui souvent perpétue et produit l'invalidisme. C'est la perpétuation des symptômes qui résulte de l'ignorance. Une incapacité latente prolongée augmente les symptômes organiques et les désigne comme hystériques.

Dandy prétend que l'ouverture d'un disque traumatisé procure le soulagement ou la guérison. Nachlas demande correctement quelle partie de l'opération produit le soulagement? Il ajoute "il y a naturellement flexion vértébrale sous anesthésie." Une opération de décollage est nécessaire pour exposer le disque. Le nerf est fréquemment tiré par retraction. Il se demande si l'opération du disque n'entraîne pas en elle-même certains éléments d'autres procédes telle la fasciotomie, la myotomie. Les dermatomes sont des facteurs de grande valeur pour localiser les lésions introspinales qui intéréssent le cinquième nerf lombaire ou dérangent la sensation de la peau du haut du gros orteil du dessus du pied et de la jambe. Les lesions affectant la sensation de l'aspect latèral de la jambe sont souvent initiées par le second nerf sacral.

RIASSUNTO

I sintomi caratteristici ed i segni che abbiamo imparato quali patognomonici dei tumori spinali valgono egualmente (ad eccezione dell'intermittenza dei sintomi nelle lesioni dei dischi) per la diagnosi delle sindromi da dischi intervertebrali. Si tratta indubbiamente di diagnosi difficili, che se non vengono poste esattamente, conducono ad un'invalidita' permanente, a disturbi nervosi gravi.

Non esiste, purtroppo, un accordo fra chirurghi delle ossa a chirurghi del sistema nervoso. I primi dicono: "attendete fino a che vedrete quanti casi di asportazione dei dischi richiedono poi una successiva fusione delle vertebre." Gli altri rispondono: "se sapeste quanti casi di fusione delle vertebre avrebbero richiesto invece l'asportazione dei dischi."

L'A. richiama l'attenzione sopra la frequenza con la quale la semplice apertura del disco traumatizzato conduce ad un miglioramento od alla guarigione. Durante le operazioni per i dischi sembra che lo stiramento delle radici nervose, l'incisione delle fascie e dei muscoli, esercitino la stessa azione benefica delle manipolazioni sacre-iliacre.

La localizzazione delle lesioni intraspinali e' molto facilitata dalla conoscenza dei cosidetti dermatomi. Le lesioni interessanti il quinto nervo lombare disturbano infatti la sensibilita' delle pelle a livello del pollice ed una striscia cutanea del piede e della gamba. Lesioni che involgono il primo nervo sacrale modificano la sensibilita' della pelle sopra il dorso del piede. Lesioni del secondo nervo sacrale si riflettono ai lati della gamba.

SUMARIO

Los sindromo s clásicos e indicativos de tumores de la medula espinal se usan hoy en dia en el diagnostico de las fracturas del disco intervertebral (con excepción de su intermitencia en estas ultimas lesiones).

Según el cirujano ortopédico la resección del disco intervertebral requiere tarde o temprano la fusión vertebral. Entanto el neurocirujano clama la necesidad de laresección del disco ántes de que se practique la fusión espinal.

Hoy an dia el problema depende de lo siguiente: Cuantos casos de resección del nucleo pulposo requeriran con el tiempo la fusión espinal? Cuantos casos de fusión requeriran la resección del disco? Cuantos casos de resección del disco necesitaran la fasciotomia?

El diagnostico del nucleo pulposo es en muchos casos una mascara para cubrir errores de diagnostico en esta clase de casos.

Segun Dandy el mero hecho de abrir el disco traumatizado produce alivio o curación. Nachlas correctamente pregunta: Cual procedimiento de la operación produce el alivio? y luego anade durante la operación producimos bajo la anestesia una flexion moderada de la columna espinal. Las raices nerviosas son estiradas durante la retracción que es necesaria en la operación. También se llevan a cabo otros procedimientos tal como manipulación sacro-iliaca, esteramiento del nervio ciatico mayor, fasciotomias y miotomias.

Los dermatomas son de valor en la localización de lesiones intraspinales.

Endometriosis as Cause of Small Bowel Obstruction

A Report of Three Cases

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ENDOMETRIOSIS is one of the causes of intestinal obstruction of the small bowel which text books fail to list. Indeed, only 11 cases have been reported in the English literature. Zander and D'Ingianni each had the opportunity of exploring independently a patient with intestinal obstruction due to endometriosis of the small bowel. These two cases will be presented along with the only recorded case in the files at Charity Hospital in New Orleans. A survey of the English literature on this subject will be employed as a background.

Cullen first reported adenomyomas of the uterus in 1895. It was not until 1921, however, that a most complete study of the origin, symptoms and treatment of endometriosis was given by Sampson. Since Sampson's work the causes of endometriosis have been debated from time to time, and the present study can add little to these speculations. Rather is it our purpose to confine ourselves to summarizing the findings in the cases herein presented in some attempt to clarify the preoperative diagnosis, if possible.

CASE REPORTS

Case 1.—C.F., 32, complained chiefly of low abdominal pains, radiating into the back, accompanied by nausea, vomiting and hoarseness. She had been constipated for three days. Three months ago she noted a mass in the abdomen.

Menses started at 12 years, and had been irregular for the last few years with flooding and clots. She complained of dysmenorrhea and dyspareunia. There was no history of pregnancy.

A mass, about 10 cm. in diameter, was palpated in the lower abdomen, with rigidity and tenderness in the right adnexia. The diagnosis was fibroids and bilateral salpingitis. On Nov. 22, 1941, the patient was given infusions and blood transfusions. By a midline incision under spinal anesthesia a large fibroid was removed. A total hysterectomy was done along with an appendectomy. In doing so, a loop of the ileum was seen to be kinked. These bands were liberated.

On Dec. 25 the patient began to have nausea, vomiting and constipation. The thyroid was enlarged. There was tenderness below the umbilicus with distention. Diagnosis of partial intestinal obstruction was made. A roentgenogram of the abdomen showed no fluid levels; infusion and gastric suction relieved the patient.

On Jan. 5 she began having sharp abdominal pains with nausea and vomiting, epigastric distress and a growing mobile mass, the size of a hen's egg, in the lower right quadrant. She noted loss of appetite and weight. There was a history of jaundice and black stool with blood at times. The blood pressure reading was 128/64. Icterus index was 30; white blood count, 13,800. The roentgenogram showed no evidence of fluid level, nor of gallbladder calculi. A barium enema was negative. There was a tenderness over the scar. The patient had hyperstaltic motion with two small bowel movements.

On Jan. 26 the Miller-Abbott tube was seen in the cecum. The next day a right rectus incision was made under spinal anesthesia. A nodule 1×2 cm. was found on the mesenteric border of the ileum 50 cm. from the ileocecal valve. It was thought to be intraluminal. Ten centimeters of the ileum bearing the lesion were resected and continuity reestablished by end-to-end anastomosis. The pathologist's report was endometriosis of the ileum. Postoperative course was uneventful.

Case 2.—A.F.D., 38, complained of pain in the lower right quadrant for a year and a half. She was troubled by dysmenorrhea, pains in the midline and backache. Menstrual pain occurred one to two days before periods, which were regular until four months previously; since that time her periods occurred from 16 to 26 days apart.

The patient gave a past history of colitis and gastric enteritis in 1935 and 1936. In May, 1938, she had a diagnostic curettage and cauterization of the cervix. In July, 1938, she was operated upon for a fistula. In 1940 she had another diagnostic curettage, cauterization and perineal repair. In 1943 she had a general examination including roentgenograms, but no abnormal findings resulted. In 1944, after an attack of severe cramps, a diagnosis of gastric enteritis and colitis was again made. In 1944 roentgenograms were

negative for gastro-intestinal pathology. On Nov. 6, 1945 she was admitted to the hospital with diagnosis of gastric enteritis. She was discharged on Nov. 9. Laboratory findings on the whole were negative. The blood count showed slight leukocytosis with no change in the red count. This condition subsided before the patient was discharged. Sedimentation rate and stool were normal. There were no roentgenologic findings.

As for her marital history, there had been one pregnancy with a forceps delivery in 1939, which left a bad laceration.

On Dec. 4 bimanual examination revealed a cervical polyp, retrodisplaced uterus with second degree prolapse and a cyst of the left ovary. On Dec. 5 exploration revealed a chocolate cyst of the left ovary, prolapse of the right ovary, retrodisplaced uterus, chronic endometriosis, nabothian cyst of the cervix and subacute appendicitis. Resection of the left ovary was done with suspension of the right ovary and suspension of the uterus (Gillean). A diagnostic curettage with cauterization of the cervix as well as an appendectomy were done and the postoperative condition was good.

On Jan. 27 she was readmitted to the hospital complaining of abdominal pain. Two weeks previously, after eating pork, she began having abdominal pain and diarrhea. She noted a mass in the lower right quadrant which moved toward the left. Pain and vomiting persisted. Physical examination revealed normal temperature and increased pulse and respiratory rate. Peristalsis could be seen on the abdominal wall with a mass in the lower right quadrant. Tympanitis and borborygmus were present. A roentgenogram showed intestinal obstruction. Exploration on Jan. 29 revealed a mass involving the terminal ileum and the omentum. The involved area was resected and an end-to-side ileo-ascending colostomy was done. A partial intestinal obstruction was found with stenosis of the ileum, due to what was tentatively described as tubercular ulcers of the ileum. The pathologist's report was endometriosis of the ileum with acute and chronic inflammation with congestion and edema. Postoperative convalescence was uneventful.

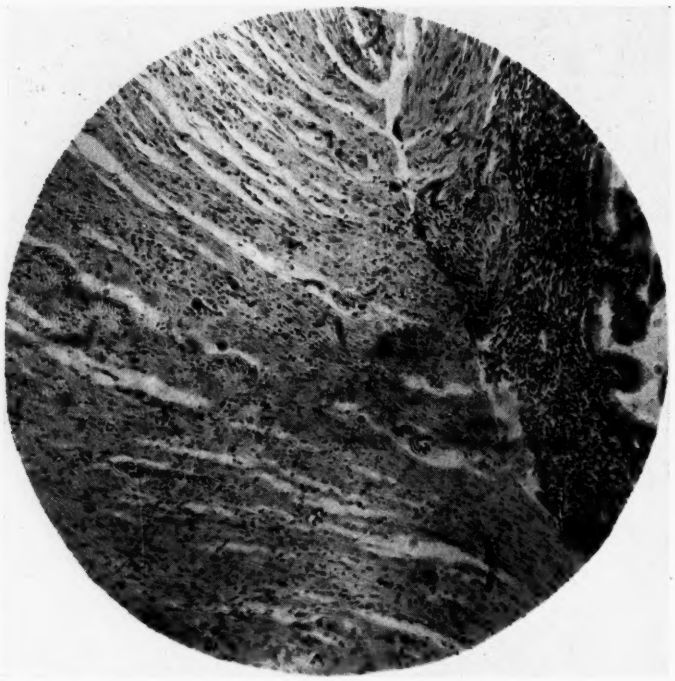

Fig. 1. Photomicrograph of specimen from Case 1.

Case 3.—E.G. complained of pain in the lower right quadrant for the previous eight months.

The pain became worse with each menstruation. Her periods had been markedly irregular, lasting from a few hours to 15 days. She was sterile, giving no history of pregnancy. She complained of pain in the lower abdomen on intercourse, and said that frigidity had developed after an operation. The patient noticed a growing mass in the lower right quadrant during the past few months. Occasionally she had attacks of pain with nausea and vomiting, until she was unable to retain food or fluids. One and a half years ago she was admitted to the hospital. Along with a diagnostic curettage, the left ovary and tube were removed, and the right tube and part of the right ovary were resected. Diagnosis of salpingo-oophoritis was made. For a short time the patient was well and regained weight.

On Jan. 6, 1946, she was admitted to the hospital with diagnosis of a large ovarian cyst. Exploration revealed a mass 14 cm. in diameter in the lower right quadrant (20 cm. from the ileocecal valve), which involved the cecum, several loops of the terminal ileum and the omentum. The entire mass was bound down posteriorly and into the pelvis as well as on the anterior abdominal wall. The surgeon felt that the mass was either a remnant of an inflammatory reaction or possibly a malignancy; therefore, it seemed better to do a circuiting procedure, and, if necessary, at a later date a resection. The uterus was found in good position. The right ovary was approximately 6 cm. long and showed multiple cystic degeneration.

Fig. 2. Photomicrograph from specimen in Case 3.

Material was taken for biopsy, and the first free loop proximal to the mass was anastomosed with the proximal portion of the transverse colon. Her condition was good. The pathologist reported chronic inflammatory reaction of the tissue. For three days she was in excellent condition.

Suddenly, on Jan. 10, she became dyspneic, cyanotic, with the facies of impending death. Within an hour after onset of these findings she died of massive pulmonary emboli. Autopsy examination revealed the ileum and cecum and omentum matted together. There was no leakage from the site of the anastomosis; there was a kinking of the ileum about 20 cm. from the ileocecal valve with many adhesions about the ileum, and at this area there was evidence of endometriosis with chronic inflammatory reaction in the cecum and the ileum.

DISCUSSION

According to Masson endometriosis is found in women between 25 and 45 years. The ages for those having involvement of the ileum ranges from 19 to 50. However, Schofield and Bacon reported a case as early as 11 and another at 72 years of age. In only nine cases found in the English literature could age be established; six of these were in the third decade.

Little information could be obtained from the literature concerning race incidence, except the repeated statement that endometriosis is considered relatively rare in Negroes. Curiously enough, one of our cases, the Charity Hospital case, is that of a Negress.

Surveying the literature brought to light the fact that endometriosis of the small bowel is not nearly so common as that of the large bowel; only 11 cases involving the small bowel were reported as compared with 40 cases by the same authors involving the large bowel (and 5 involving the appendix); this gives a ratio of 1:4. However, in pelvic operations where endometriosis of the ovary, cul-de-sac, or any other organ is found, it is worth spending time examining the small gut, for among the 11 cases reported, 8 had had a previous operation.

The symptoms complained of by patients with endometriosis vary with the organ or group of organs involved; therefore there was no set pattern of complaints. However, we shall try to group the symptoms complained of most constantly.

Dysmenorrhea of the acquired type was a prominent symptom. The dysmenorrhea grew progressively worse. In the survey seven patients stated that it was accompanied by nausea and vomiting, which likewise became aggravated. Five patients had intermenstrual pain which became worse during menses. Scanty periods occurred in four cases and was complained of over a period of years. Sterility was present in all cases and is a prominent finding in patients with endometriosis. Whereas Smith reports sterility in only 20 per cent of his cases, Shier finds it in 84.2 per cent of his group.

Dyspareunia was found in two cases reported upon, but this complaint is more common in cases of endometriosis of the sigmoid and of the rectum. Diarrhea likewise is a common complaint in endometriosis of the sigmoid, yet it was complained of in one of our three cases, in endometriosis of the ileum. In this particular case the patient had been treated for many years for colitis, which cleared up on removal of the involved tissues.

Reports that some pelvic pathologic process is always present in endometriosis, usually displacement of the uterus, is confirmed in this study. In every case the process was considered of sufficient prominence to warrant intervention. One patient had a large uterine fibroid, another marked retrocession, another had marked anteflexion with large adnexal masses.

The site of involvement of the ileum is interesting to follow in the cases reported; undeniably, it is close to the ileocecal area: 50 cm. away in one case, 6 cm. away in another case and 20 cm. away in the third case. Gale reported a case 60 cm. from the cecum; Glenn reported one 15 cm. proximal to the cecum.

Another finding that was constant in the cases of intestinal obstruction of the small bowel due to endometriosis was the presence of a loop of ileum that was puckered or kinked, bound down by adhesions that were fibrous in type.

One of the reasons for the difficulty of diagnosing endometriosis as cause of intestinal obstruction of the small intestine is that it resembles several other conditions, notably carcinoma of the bowel, diverticulitis and acute inflammatory disease. Several attempts have been made at differential diagnosis, but little success has been attained. For example, a point much stressed in differentiating endometriosis from carcinoma is that endometriosis does not involve the mucosa. However, in one of the cases presented here there was definite evidence of ulceration of the mucosa, and the mass seemed to be intraluminal. The gut became involved by an annular type of growth. Many cases of carcinoma, so-called "cured" by deep x-ray therapy were evidently not carcinoma at all, but endometriosis.

As regards treatment, simple bilateral oophorectomy has been suggested by Hutchins of Boston and agreed upon by many surgeons.

Andrews adds that the opportune time for operation is midway in the interval between menses. It is the opinion of the authors, however, that each case must be considered by itself, for the approach depends largely on the age of the patient and the extent of involvement. It seems wise to treat conservatively at first, for the obstruction is usually only partial, as is proved by roentgenograms and the fact that the Miller-Abbott tube can pass the point of obstruction. Once the acute stage is over, operation can be performed at the opportune time between menses, on a patient better able in many ways to withstand surgery.

It is a debatable point whether simple bilateral oophorectomy will relieve intestinal obstruction because of the presence of a tremendous quantity of fibrous tissue, which may eventually lead to a cicatriced obstruction. This point cannot be answered adequately, because none of the authors reported having tried this procedure. It is highly probable, however, that many cases of endometriosis of the ileum have gone undiagnosed, and the condition may have improved as a result of bilateral oophorectomy or the use of radium.

Having been confined to facts and findings up to this point, a few postulations and assumptions, which are a weakness with many of us, may not be considered irrelevant here. What are the predisposing causes of endometriosis? Other authors list uterine myomas, chronic salpingitis, retroflexions, previous inflammation, etc. Let us add the possibility of the following: Frequent and unskilful cauterizations of the cervix, improper conization of the cervix, insufflation of the tubes, injection of lipoid material and poor operative obstetrics. A particularly good example is the patient in Case 2, who gave a repeated history of cauterizations and conizations and a bad laceration following forceps delivery, as well as the continued inability of roentgenograms to reveal abnormal conditions.

As regards a preoperative diagnosis: whenever we find a patient with partial or complete intestinal obstruction, who has a history of sterility, dysmenorrhea, dyspareunia and previous pelvic diseases, where endometriosis was found, it is indicated that the obstruction is due to endometriosis of the small intestine.

SUMMARY

The authors report three cases of endometriosis as cause of partial and complete small bowel obstruction, with a survey of the English literature as background.

In an attempt to clarify the preoperative diagnosis, the age incidence, signs and symptoms, site of involvement and laboratory findings are aggregated. General suggestions regarding treatment are outlined.

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Present Concepts in the Management of Both Chronic and Acute Appendicitis: With a Report on 12,813 Consecutive Appendectomies*†

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FROM available data, the appendix vermiformis was first discovered in the year 1524 by Berengario da Carpi, Professor of Surgery at Pavia, who left the first preserved written account of it. Andreas Vesalius,[1] in 1543, was the first to describe accurately and illustrate the normal appendix and its relationships to other abdominal structures in "De Fabrica Humani Corporis." In 1886, Reginald Fitz,[2] Professor of Pathology at Harvard Medical School, published his epoch-making article on the successful drainage of 100 cases of appendiceal abscesses as collected from the literature of the United States, covering the period 1848 to 1886. From his study he showed for the first time, in a clear decisive manner, that until proved otherwise all inflammatory processes in the right lower quadrant of the abdomen should be considered as originating in the vermiform appendix. Fitz was the first to coin the term "appendicitis." After this important contribution, the present treatment of appendicitis rapidly crystallized.[3] We find the leaders of American surgery in each generation seriously concerned with what would constitute better treatment of this common but deadly acute surgical disease. McBurney,[4] McArthur,[5] Senn,[6] Morris,[7] Oschner,[8] Murphy,[9] Moynihan,[10] the Mayos,[11, 12] Crile,[13] Deaver,[14] Monte Reid,[15, 16] and others left valuable contributions toward the better management of this disease.

Owing to the rapid expansion of other fields in abdominal surgery, the vermiform appendix has received less attention than formerly, but it nevertheless continues to play the stellar role.[17] Hoerr[18] discovered with dismay that the mortality rate from acute appendicitis at the Peter Bent Brigham Hospital between the years of 1913 to 1940 had shown no improvement. We had forgotten the classical dictum of John B. Murphy:[9] "The earlier the operation, the lower the mortality." Any disease, which as part of its complications causes approximately 20,000 deaths from peritonitis yearly in the United States, not to mention additional deaths resulting from surgical disasters such as cardiac failure, pulmonary embolism, cerebral hemorrhage, cannot be dismissed lightly as being unimportant or a trite subject. Recently, the Metropolitan Life Insurance Company[19] reported that the mortality of appendicitis among their policy holders, aged one to 74 years, was 3.2 per 100,000 in 1946 compared to 11.5 per 100,000 in 1936.

It is readily admitted that recent statistical studies by Mueller,[20] Sorensen,[21] Ingerslev,[22] Tashiro and Zinninger,[23] Meyer, Requarth and Kozoll,[24] and Jackson,[25] show a declining mortality from acute appendicitis in the large medical centers of the world. Nevertheless, the complications of acute appendicitis and improperly performed appendectomies still kill entirely too many individuals yearly. Seventy-five per cent of appendicitis deaths are attributable to the patient, because of failure to have an appendectomy performed in the interval between acute attacks, to indiscriminate self-medication, to procrastination, and finally to self-administration of strong purgatives. The final 25 per cent of appendicitis deaths must be laid on the doorstep of the medical profession because of our failure to make a prompt and correct diagnosis, our tendency to procrastinate, to use improper surgical technic and judgment, and to exercise poor postoperative care. The first 75 per cent of these needless deaths should be vigorously combated by a program of education of the laity. Monte Reid[15, 16] has convincingly demonstrated that education of

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the laity in Cincinnati, Ohio, has markedly reduced the former high mortality of acute appendicitis in that city. The final 25 per cent of appendicitis deaths due to inadequate medical and poor surgical care constitute the chief concern of this paper.

DIAGNOSIS

Early diagnosis is imperative. Abdominal pain that persists longer than six hours in a previously well individual demands a thorough investigation to exclude a disease of surgical importance. Rectal and pelvic examinations are of far more diagnostic importance than registering the pulse rate or the temperature by mouth. Auscultation of the chest is equally as important as palpation of the abdomen. The surgeon must train himself to think in terms of anatomy and physiology. The anatomic distribution and area served by the segmental spinal nerves must be constantly recalled. A complete history must be taken and each patient must have a physical examination, followed by a complete laboratory study. Short cuts should never be permitted because sometimes an important fact that would change the entire diagnosis may be missed.

Acute appendicitis most commonly affects young adolescents but it may occur at any age. If there is localization of pain, it is a good sign that probably the appendix is situated at the parietal peritoneum. Typical pain usually begins in the epigastrium and shifts after several hours to the right lower quadrant. Often the patient may be awakened out of a sound sleep by a pain that slowly increases in severity and is of a dull constant aching character. If painful urination develops or hematuria appears, the appendix probably is situated in the pelvis. Vomiting is not an early nor a prominent complaint; usually it makes its appearance three to four hours after the onset of the pain. Nausea and loss of appetite in a patient previously enjoying a good appetite is suspicious of the presence of acute appendicitis. One should always inquire if laxatives or enemas have been taken recently. If a history of a gradual onset of constipation, pain and increasing flatulence is obtained, that patient should be carefully watched. Tenesmus frequently is a diagnostic sign of pelvic acute appendicitis or a pelvic abscess. Inquiry as to previous similar attacks is of great importance. The pulse rate is not diagnostic.

The temperature rises slowly from normal to about 101° F. in acute appendicitis and may suddenly drop to subnormal after perforation, only to rise later to 104° F. with the onset of a generalized peritonitis. In intra-abdominal diseases the ratio of the pulse to the respiration usually is more than three to one. A dry tongue is indicative of dehydration, possible toxemia, or sepsis. Commonly a coated tongue associated with foul breath is seen in acute appendicitis. A dull gaze, apathy, with sunken cheeks and eyes, found in a patient who lies in bed without moving and often with flexion of the knee and hip joints are indicative of the possible presence of a generalized peritonitis associated with an advanced toxemia.

On request the patient frequently will point to McBurney's point as the site of maximum point tenderness. Distention of the midportion of the abdomen with empty and nondistended lateral pelvic gutters is seen in neglected cases of acute appendicitis associated with a paralytic ileus or a small bowel obstruction. Acute appendicitis frequently causes limitation of abdominal respiration. Gentle palpation of the abdomen reveals involuntary muscular rigidity usually situated in the right lower quadrant. Localized deep tenderness of considerable severity commonly is localized near McBurney's point. Right flank tenderness and muscular rigidity may be indicative of a retrocecal or retrocolic acute appendicitis. Commonly, hyperesthesia in the right mammary line caudad to the umbilicus is elicited. Occasionally a pelvic or an abdominal mass may be palpated. Too vigorous palpation of such an abscess may cause its rupture with rapid development of alarming signs and symptoms of peritoneal shock. A bimanual pelvic examination is mandatory in every nonvirginal woman. There is never any excuse for not performing a rectal digital examination. A right lateral mass that is very painful, or an indurated painful area in the same area, is often indicative of acute appendicitis. Auscultation of the abdomen

may reveal a silent one indicative of the presence of intestinal paralysis due either to ileus or peritonitis. Stormy metallic tinkling peristalsis indicates the presence of intestinal obstruction.

Careful examination of the lungs, heart, and reflexes may prevent a grave error in diagnosis. Careful examination of the eyes, ears, nose, mouth, and neck may give the correct diagnosis and prevent an unnecessary operation. The urine examination is of great importance and prevents one from operating upon a case of renal or ureteral disease. My father always disregarded the white blood count if it did not fit into the rest of the clinical picture. Leukocytosis with a Schilling shift to the left and high percentage of juvenile and stab forms, confirms the diagnosis. The blood count should never be the basis upon which to decide for or against operation. The blood pressure is of value to indicate whether a state of collapse is imminent, or it may show the degree of shock present. Posteroanterior roentgenograms of the chest and a flat scout film of the abdomen may give very valuable information. Perforation of a hollow viscus, intussusception, ileus, or intestinal obstruction either in the small or large intestine may be delineated.

Anatomic Location of Appendix. As consultant, called in to see patients with vague and nonclassical signs and symptoms of abdominal pain, it has been my experience to find that no rectal or pelvic examination had been performed by the attending physician because this type of examination might be distasteful to his patient. Such a flimsy excuse for not performing two of the most important examinations when dealing with a case of suspected acute appendicitis is unforgivable. When such an examination is made by the consulting surgeon it facilitates prompt diagnosis and furnishes the surgeon with the exact location of the vermiform appendix within the peritoneal cavity. Conversely, when inexperienced physicians, encounter no evidence of localized point tenderness in the lower peritoneal cavity in the course of a rectal or a pelvic examination, and superficially find no evidence of muscle-guarding or peritoneal irritation, they assume that appendicitis cannot be present.

It must be remembered that the vermiform appendix may assume any location within or adjacent to the peritoneal cavity.[26] In the classical work, "The Vermiform Appendix and Its Diseases," by Howard A. Kelly and E. Hurdon, published in 1905, the various anatomic sites of the appendix are shown.

It is regrettable that many American surgeons apparently have not realized that acute retrocecal appendicitis may mask its symptoms so as to trap the unwary.[27, 28] Commonly, aside from the history, the only positive diagnostic sign which may arouse the suspicion of acute appendicitis, is a marked localized point of tenderness when pressure is made in the right lateral flank behind the cecum. I can call to mind three Doctors of Medicine who were hospitalized in great teaching hospitals, and who died because their attending physicians failed to recognize the presence of an acute gangrenous, perforated, retrocecally placed appendix. Fortunately, I have been able to prevent a lethal outcome in the case of several office nurses of prominent surgeons suffering from acute appendicitis localized in similar sites.

When a patient presents himself with a complaint of a recurring localized, sharp lancelike right lower quadrant pain, with a history of similar attacks in the past and which the attending physician had diagnosed as acute appendicitis, the only proper attitude by the surgeon is one of skepticism. A most careful history and physical examination are necessary together with complete laboratory and x-ray studies to make certain by a process of exclusion that the only structure that could possibly be involved must be the vermiform appendix. Right-sided genitourinary disease, pelvic disease in a woman, diseases of the small or large bowel, cardiac or pulmonary diseases and finally disease of the nerves supplying the right lower quadrant must be painstakingly ruled out.

The surgeon should have a very definite opinion as to the anatomic location of the vermiform appendix before making his operative incision. Commonly, this is made exceedingly simple by the expedient of a rectal or pelvic examination. If both examinations are negative, then, following diversion of the patient's attention, sharp pressure in the right

lateral flank will often show the location of an acutely diseased retrocecal appendix. If all three of these diagnostic procedures are negative, the possibility of a partial or complete nonrotation of the cecum should be considered. Therefore, left-sided lower quadrant abdominal pain should not be blandly dismissed as excluding an appendicitis unless chest and flat x-ray plates of the abdomen prove beyond doubt that one is not dealing either with a transposition of the viscera or failure of complete rotation and descent of the cecum into the right lower quadrant.

DIFFERENTIAL DIAGNOSIS

Commonly, a differential diagnosis must be made between acute appendicitis and acute cholecystitis or acute salpingitis. Dependent upon whether complete rotation and normal descent of the cecum has occurred, the inflamed appendix vermicularis may be found in any area of the peritoneal cavity. Acute pelvic appendicitis may have to be differentiated from intestinal obstruction, ureteral calculus, perforated typhoid ulcer, Meckel's diverticulitis, diverticulitis with abscess formation and, in women, salpingitis, ruptured pyosalpinx, twisted pedicle of ovarian cyst or pedunculated uterine leiomyomas, hydrosalpinx, and ectopic gestation. If the situation of the appendix is iliac, differentiation may have to be made from mesenteric lymphadenitis,[29] carcinoma of the cecum, psoas abscess, hip disease, a leaking perforated peptic ulcer, and ileocecal tuberculosis. The ascending vermiform appendix may have to be distinguished from a perforated gallbladder, cholecystitis, or a duodenal ulcer.

Often a number of purely medical conditions must be borne in mind lest one be led to operate in a nonsurgical condition. Intrathoracic lesions that may simulate an acute surgical abdomen are angina pectoris, acute pericarditis, acute pleurisy, acute bronchial or lobar pneumonia, acute diaphragmatic pleurisy, and acute pneumopericardium. Renal disease may cause confusion, especially uremia. Tabes dorsalis with gastric or intestinal crises may trap the unwary. Blood diseases such as leukemia or acute infectious mononucleosis may mimic acute abdominal lesions. Retroperitoneal lesions that have proved confusing are acute pancreatitis, rupture of aortic aneurysms, dissecting abdominal aneurysms, retroperitoneal bleeding or extravasations of urine or bile, and retroperitoneal tumors.[30] General diseases often confuse the surgeon, particularly in their early stages. Among these are malaria, lues, influenza, typhoid fever, diabetes mellitus with impending coma, tuberculous, gonococcic or pneumococcic peritonitis and ptomaine poisoning.

MANAGEMENT

No one should attempt to open the peritoneal cavity with a preoperative diagnosis of acute appendicitis unless he is fully qualified to cope successfully with any acute surgical condition which he may encounter. Auchincloss [31] is in complete agreement with this concept. In recent years the performance of an appendectomy has been viewed with considerable contempt and it is not at all strange, but dismaying, to learn that even our hospital interns with only one or two months of training have become so blase that a mere appendectomy is beneath their interest. The experienced surgeon knows that an operation for acute appendicitis can be extremely simple or one that will tax to the utmost all of his previous surgical skill and years of surgical judgment. For these reasons I have desired to call attention to this subject again in an attempt to crystallize what is considered to be the present accepted treatment in the successful management of acute appendicitis and its many complications.

It is axiomatic that once a diagnosis of either acute or subacute appendicitis has been made an immediate abdominal exploration becomes obligatory. No personal reasons should be permitted to delay operation. Seldom will an appendectomy have to be postponed because of the patient's critical condition resulting from gross neglect. If when first seen the patient is rapidly improving from his appendicitis, it may be reasonable to postpone an appendectomy for several months and then operate in the interval.[24] Spinal anesthesia is the anesthesia of choice, except in the very young, the aged, or those with marked arterial hypertension. General inhalation anesthetic agents should be avoided

wherever possible. The patient's desires as to anesthesia do not constitute a valid reason for not giving a spinal anesthetic.

Incision. In the great majority of males and in females in whom the diagnosis is certain, the muscle-splitting so-called "McBurney incision"[4] (which, in passing, should correctly be called the McArthur incision[5]) should be used routinely with the single modification that the skin incision should be made obliquely in the direction of the skin cleavage planes of the right lower quadrant of the abdomen. Babcock, Hamilton, Bailey,[32] Hoerr,[18] Mueller,[20] Karl Meyer *et al.*,[24] Norris,[34] and Monte Reid,[15, 16] have advocated the use of the McArthur muscle-splitting incision as being the safest of all abdominal incisions in routine cases of acute appendicitis. The only structure of importance in the superficial layers of the wound is the right circumflex iliac artery, which should be palpated with the finger and then carefully mobilized and retracted laterally. If this incision is properly made, there should be little or no need for hemostasis down to the aponeurosis of the external oblique muscle. The only advantage that the McArthur incision possesses is that it keeps the surgeon from meddlesome exploration of the remainder of the peritoneal cavity. The skin incision normally should not be longer than approximately 5 cm. because with such an incision, if gross infection is encountered about the vermiform appendix, the necessity of fighting a postoperative anterior abdominal wall phlegmon is materially reduced.

When the peritoneal cavity is opened the gross surgical pathology should be examined first. The index finger should never be blindly jammed into the wound in an effort to deliver the vermiform appendix without first conducting a preliminary reconnaissance of the conditions presented. Too many patients die needlessly because their surgeons do not observe this basic principle of good surgical judgment, thereby rupturing acute gangrenous specimens by their too hasty and rough mobilizing tactics. It might be a good idea to place a copy of Sir Frederick Treves' well known sketch, entitled, "The Idol with Hands of Clay" in the surgeons' dressing room in hospitals as a grim reminder. This sketch graphically depicts the fatal end of an appendectomy, where the surgeon had "hooked-out" the appendix, only to have it followed immediately by a sudden profound fatal hemmorrhage from the depths of the wound.

Next to delay in getting the appendix removed from the abdomen, many appendiceal deaths in this country result from the improper employment of a right rectus type of incision which was never intended for the removal of the appendices in the great majority of examples of acute appendicitis. Meyer *et al.*[24] state that the nearer the incision is placed toward the midline in instances of acute appendicitis, the higher is the mortality rate. The right rectus incision is likewise one of the most vicious incisions through which to bring to the outside drainage tubes of various types.

The McArthur incision has another marked advantage in that this is the only incision that affords proper exposure in the acutely inflamed and bound down retrocecally situated vermiform appendices. Frequently, in acute retrocecal appendicitis, it is neither necessary to enter nor to open widely the peritoneal cavity in order to perform an appendectomy easily and to care adequately for the operative site.

Appendiceal Stump. It is regrettable that many American surgeons failed to heed the teachings of my former beloved Professor, Dr. H. E. Robertson,[35] who formerly with great distinction headed the Section on Pathologic Anatomy at the Mayo Clinic. Over the years he preached and contended, often futilely, that from a pathologic standpoint the stump of the vermiform appendix should not be invaginated into the so-called "head" of the cecum. Dr. Robertson repeatedly demonstrated that stump inversion invariably leads to the formation of an intramural abscess of the cecum at the site of such inversion. Wayne Babcok[36] agrees with this concept. Such an abscess must drain in one of two directions. It may drain into the lumen of the cecum, in which case no great damage results. But if this collection of pus drains by the other route of escape, namely, into the peritoneal cavity, the patient's life has for the second time been carelessly placed in

jeopardy. Wayne Babcock aptly remarks, "An experience of many years has shown how unnecessary it is to use a pursestring suture in the cecum. Indeed, such a suture, in passing through Peyer's patches in the cecum, may drag bacteria into the incision and increase the danger of wound infection." Large series of cases have shown beyond any doubt that the inversion of the ligated stump of the vermiform appendix has consistently resulted in increased mortality and more postoperative morbidity, when comparison is made with similar types of appendicitis in which stump inversion is not done. Likewise, how often have we seen the development of a large fecal fistula resulting from necrosis of the inverted cecal area, postoperatively, with its resultant grave postoperative morbidity, needless secondary operations and, worst of all, needless deaths.

The opponents of noninversion of the appendiceal stump have proposed to invaginate the stump without ligating it. At first consideration, this method would appear to answer all of the objections which I have raised, but in my personal experience I have seen 7 patients bleed to death because the blood supply to the stump of the vermiform appendix had not been ligated and could not be controlled postoperatively.

Two No. 2 40-day chromic ligatures are applied 0.5 cm. apart at the appendiceal base, tied securely with three square knots and the ends of the ligatures cut 2.0 cm. long. At the present time this is the safest manner in which to treat the appendiceal stump.

Nondrainage versus Drainage, and Chemotherapy. No instance of acute perforative appendicitis, complicated by a diffuse peritonitis should be drained today, because of the availability of specific chemotherapeutic agents and specific antibiotic preparations. I have not drained a single example of acute diffuse peritonitis resulting from acute perforative appendicitis in the past nine years and have had no reason to regret this choice of nondrainage. Crile [13] has substantiated this new concept of deliberate nondrainage. Blain and Kennedy [37] believe that penicillin acts as a detoxifying agent in instances of toxemia resulting from intestinal obstruction. Brown [38] believes that the combined use of sulfonamides and penicillin has greatly lowered the mortality and postoperative morbidity rates in instances of peritonitis. Since the advent of specific chemotherapeutic and antibiotic agents the concept of nondrainage of generalized peritonitis in cases of acute perforative appendicitis, even in patients with a purulent fibrinous peritonitis, has been steadily gaining more converts. Today, surgeons who insist on the routine continuance of intraabdominal drainage are classified as being dangerous and out of date.

Too many instances of postoperative bowel obstruction and wound evisceration have resulted from the routine and unintelligent continued use of rubber drains of one type or another. Farkas [39] reports that all appendices, including those with perforation, were not drained from the peritoneal cavity. The only exception was made in localized abscess formation where drainage was employed. I have been in complete agreement with this concept for over 10 years, and so stated my beliefs in 1938.[28] As one's surgical ability improves with the passage of years, more and more appendices will be removed from appendiceal abscesses without breaking down Nature's protective abscess walls. Every safe effort should be made to remove the diseased appendix at the original operation. Failure to do so increases the mortality and the later necessity of secondary operations. Farris and Romack [40] believe that bacteria are the predominating factor in deaths following "closed-loop" obstructions and that chemotherapy has a marked influence in combating their deleterious effects. In all instances of acute appendicitis complicated by acute peritonitis, either localized or generalized, as well as appendiceal abscesses, intraperitoneal implantation of 5 Gm. of sterile sulfanilamide powder should be routine procedure. The use of sterile sulfathiazole and sulfadiazine powders has been discontinued because of unfavorable experimental evidence and personal experiences which have convinced me that these two preparations are often dangerous to implant either within the peritoneal or the abscess cavity. In certain instances their use has been followed by focal necrosis, toxic hepatitis, as well as sulfonamide crystalluria. The fact that the surgeon can obtain 100 times the

blood level concentration at any particular peritoneal site he desires by local implantation of sterile sulfanilamide powder demonstrates the great advantages resulting from this technic. Arnold Jackson [25] recently reported on 15 personal cases similarly treated without drainage with great success. Sorenson,[21] Mueller,[20] and Kaufman and Hersheimer,[33] for their great value, advocate the sulfonamides in appendicitis.

In addition to the employment of sulfanilamide when indicated, I administer routinely in all instances of this type, 1 million units of crystalline penicillin dissolved in 20 cc. of sterile triple distilled water and this solution placed either within the peritoneal or the abscess cavity, as the case may be. The rationale for this added procedure is the fact that the penicillin will successfully combat and inactivate the highly lethal gram-positive bacilli and cocci which would commonly kill the patient and on which sterile sulfanilamide powder would have no appreciable bacteriostatic effect.

The third antibacterial agent which I have added to my routine postoperative care in the past two years is streptomycin. It has been our practice to employ 1.5 Gm. of streptomycin divided into four equal doses once every six hours, along with 100,000 units of crystalline penicillin both being injected intramuscularly deep into the buttocks every three hours daily, using separate syringes, until the patient's temperature drops to normal, the abdominal distention disappears and there has been a bowel movement. Under such a regime and without any type of drainage except from the muscle layers outward in the incision, I have encountered not a single instance of postoperative abscess formation within the peritoneal cavity. No instance of acute appendicitis is given anything by mouth until the abdominal distention disappears, the temperature drops to normal and flatus has been passed. Patients usually are given three intravenous infusions each 24 hours: one intravenous infusion of 1,000 cc. of 5 per cent glucose in normal saline; and two infusions, each consisting of 1,000 cc. of 5 per cent glucose in sterile water to which has been added one ampule of "Solu-B" and 500 mg. of Vitamin C, to insure a rapid and firm healing of the wound. Blood plasma or whole blood transfusions are freely used when indicated. A positive fluid balance and normal blood chemistry components are rigidly maintained.

Sutures. In obvious cases of purulent appendicitis or appendiceal abscesses, the peritoneum may or may not be tightly closed as the case may be. Great care is taken *not* to place sutures in the aponeurosis of the external oblique muscle, in the subcutaneous adipose layer, nor in the skin. Bitter experience in the past has demonstrated the fallacy of attempting to close such grossly contaminated wounds and this is another added blessing of performing an appendectomy wherever possible through the muscle splitting McArthur incision. If sutures are placed in the external oblique aponeurosis in such grossly infected cases they will promptly slough out and there will be a disastrous loss of this important fibrous supporting structure which might lead to an incisional ventral hernia later.

Any sutures placed in the subcutaneous fat or skin will act as wicks to conduct the infection into clean noninfected areas. Under this regime in my own cases of appendectomy, postoperative ventral hernia occurred only once. (This took place 9 months after operation in an elderly, obese individual, 75 years of age, who in the spirit of "his second childhood" insisted upon chopping down trees and swinging a sledge in a gold mine for two months to prove to all concerned that he was as good a man at 75 as he had been at 35.)

The possible exception may be the use of stainless steel wire or annealed rustless steel that has been championed by Wayne Babcock [36, 41, 42] in recent years. When it is necessary to place a drain in the rare instance of a markedly purulent peritonitis secondary to an acute appendicitis, I can unhesitatingly recommend the glass or alloy steel "sump" drain [43, 44] in which there is contained a separate inner suction tube attached to a small gentle "flea"-power suction motor. In the instances in which I have employed Dr. Babcock's sump drain, it has worked perfectly and I have not been faced with a postoperative bowel obstruction nor an evisceration of

the incision. The Chaffin-Pratt suction motor frequently has been my "ace in the hole" in critically sick postoperative patients.

Ambulation. In this disease no patient is allowed out of bed *until* he has been afebrile for 36 hours, abdominal distention has disappeared and a bowel movement has occurred. This plan of postoperative management is "old-fashioned," but I have yet to lose a patient from complications directly attributable to too early ambulation. It is obviously folly to get a patient out of bed when nature is doing her utmost to localize and clean up a diffuse peritonitis. To impose upon nature by the breaking down of resistance from too much activity is not good surgical judgment. Too many surgeons are Pollyannas; generally they hope that a duodenal or a Miller-Abbott suction tube will not be needed in their particular patient because it may inconvenience them. Too many case histories are available of fatal terminations where the patient was suffering from a paralytic ileus in which, lamentably, duodenal or Miller-Abbott suction tube drainage was instituted in the last 18 hours of the patient's life. I feel very certain that the great majority of these patients could have been saved if the surgeon had instituted such a type of drainage immediately following surgery and thereby prevented needless toxemia, sepsis, exhaustion and final necrosis of segments of the distended small intestine.

Older and more experienced surgeons will agree that the most dangerous and fulminating types of acute appendicitis one may encounter is acute obstructed retrocecal appendicitis in which a fecalith has blocked off the lumen and thus set up the "closed-loop" type of appendiceal obstruction and gangrene caused by the marked increase of intraluminal pressure.[28] In the presence of an obvious perforated appendix either within a walled-off abscess or in instances of diffuse peritonitis, too many surgeons fail to look for a possible fecalith that may have been extruded through the site of perforation. If such a fecalith is overlooked and not removed at the time of surgery, many grave and commonly fatal postoperative complications are certain to ensue and great is the embarrassment of that surgeon at the postmortem examination of the patient when the pathologist holds up the fecalith foreign body which caused all the complications, ultimately resulting in the patient's death.

Chronic Appendicitis. Unfortunately too many surgeons have not had the benefit of a thorough grounding in surgical pathology and, after an operation, blandly tell the patient's relatives, "Oh, yes, it was very fortunate that I removed the appendix at this time, as the appendix showed chronic inflammation." If we exclude the members of the chronic infectious granuloma group, amebic colitis and a few isolated pathologic curiosities, there is *no pathologic entity* characterized by a long continued chronic inflammation, the surgeon's ideas to the contrary notwithstanding!

Bacteriologic studies on so-called "chronic" appendiceal walls (209 cases), gave 16.2 per cent positive cultures.[45] Inflammation is the chief initiating agent of appendiceal obliteration. This is especially true in specimens derived from individuals under the age of 35 years. Above this age involution may partially initiate or complete the final stages of the obliterative process. The reason why the vermiform appendix is the only portion of the adult gastrointestinal tract to undergo obliteration may be explained upon the basis of inflammation, senescent involutionary tissues, inadequate terminal blood supply, poor peristalsis and inability to overcome infections that elsewhere in the intestine are of trivial importance.[46]

A poll of the leading pathologists in the country substantiates this opinion and I believe that many of our surgeons will agree with this concept.[47] There may be early beginning subacute appendicitis or subsiding subacute appendicitis but, in the opinion of most of the eminent pathologists in America today, chronic appendicitis continuing for long periods is pathologically impossible. The term, pathologists explain, means only the *normal involutionary* changes, or the healed scars of previous acute inflammation, which occur in the vermiform appendix as one grows older and the terminal blood supply to the appendix undergoes advancing arteriosclerosis. Unconsciously and unintentionally

TABLE 1. SUMMARY OF 12,813 CASES OF APPENDICITIS FOLLOWED BY APPENDECTOMY.

Types	No. Cases Male	Female	Number of Deaths	Mortality Percentage
Perforative Gangrenous	413	346	70* No. Deaths since Aug. 1946	9.22
	Total 759			
Simple Acute	1368	1801	10 None Since 1942	0.31
	Total 3169			
Subacute	472	972	9 None Since 1945	0.63
	Total 1444			
Chronic	1469	5972	8 None Since 1945	0.11
	Total 7441			
Totals	3722	9091	97	0.76
	Total 12,813			

* One case not operated on.

many surgeons use the term "chronic" appendicitis in a careless manner. When such an appendix is removed and the pathologist finds only collections of lymphocytes and a few plasma cells in the submucosa (which is the normal histologic picture) he is forced to call this "chronic" appendicitis, in order to shield the surgeon medicolegally from certain unscrupulous members of the legal profession. Surely no surgeon today should be guilty of relating that a completely obliterated vermiform appendix was the principal object of his laparatomy, and that by its deliberate removal he protected the patient's life from future complications. I have read the 2 cases reported recently by Hugh McKenna.[49] The only complication that could conceivably arise in about one patient in 10,000 would be a carcinoid tumor of the appendix, while the complications and mortality from performing an appendectomy carry about ten times greater risk in the hands of even our most competent surgeons. It would be far better to state that in the course of surgery within the abdomen a prophylactic appendectomy was performed to prevent the possible occurrence of future appendicitis.

Above all, American surgeons must consistently strive to be scrupulously honest with their patients and never take the attitude that the vermiform appendix showed "chronic inflammation" and that therefore its removal at that time was a fortunate thing. In my opinion there is no surgical justification for the removal of "chronic" vermiform appendices *unless* it is done for any one of the following reasons: as a prophylactic measure in individuals with histories of previous acute attacks of appendicitis; when competent roentgenologic study of the gastrointestinal tract following a barium G.I. series demonstrates barium remains in the lumen of the vermiform appendix for 72 or more hours after its original ingestion; when there is definite kinking of the appendix; when fecaliths can be demonstrated lying within the lumen; or when definite pain and tenderness over the vermiform appendix can be elicited upon direct palpation under the fluoroscope.

Appendicitis in the Elderly. Great care must always be exercised when dealing with individuals past the age of 50 who complain of abdominal pain. The signs and symptoms of acute appendicitis in persons over the age of 50 are commonly quite bizarre and frequently their pain and evidence of peritoneal irritation are minimal.[30] The mortality and morbidity of acute appendicitis in the aged is markedly increased. One must constantly be on guard to remember that a vague and pecu-

TABLE 2. RELATION OF RIGHT RECTUS INCISION TO MORTALITY RATE.

Types	Percentage of Fatal Cases						
	Right Rectus Incision	Drained Abdominally	With Varying Degrees of Peritonitis	Reoperated Upon	With Post-Operative Bowel Obstruction	With Post-Operative Ileus	With Pulmonary Embolism
Perforated Gangrenous	87.2	77.2	69.0	19.2	14.3	10.0	5.9
Simple Acute	80.9	20.0	10.0	50.0	20.0	25.0	25.0
Subacute	88.8	33.3	33.3	11.1	11.1	0.0	37.5
Chronic	100.0	25.0	25.0	37.5	0.0	37.5	12.5

liar group of symptoms and signs of mild abdominal complaints may in reality represent an instance of acute gangrenous appendicitis. Failure to remember these facts can lead to disastrous consequences. If in doubt, when dealing with an aged individual, it is far safer to make a McArthur exploratory incision and check the appendiceal region.

STATISTICS

The histories of a consecutive series of 12,813 patients in whom a diagnosis had been made of some type of appendicitis and who were appendectomized, were studied at the Hollywood-Presbyterian Hospital, Hollywood, California, between 1933 and August 1, 1947. For purposes of brevity, the essential data of this study have been summarized in tabular form.

Table 1 delineates the distribution of these cases into various categories. In view of the fact that 147 different operators contributed cases to this study, the mortality rate must be judged charitably. It is of interest that the mortality rate for subacute appendicitis is twice as high as that for simple acute appendicitis. A possible explanation is that the severity of the infection probably was not suspected nor appreciated by the surgeon. There are occasions when the dividing line between acute and subacute appendicitis is exceedingly fine, pathologically.

The causes of 9 deaths in subacute appendicitis are distributed as follows:

Respiratory failure and status lymphaticus	1
Pulmonary embolism	3
Acute cardiac dilatation	2
Mesenteric thrombosis	2
Inability of surgeon to find a retrocecal appendix	1

In the last, the entire cecal area was covered with old fibriotic adhesions. The autopsy surgeon was much more successful.

The data shown in Table 2 substantiate the claim made previously that a right rectus incision is a poor incision through which to cope successfully with an acute appendicitis. The figures present a serious indictment against this incision. The fact that 77.2 per cent of the fatal cases of acute perforated gangrenous appendicitis were drained raises considerable doubt of the value of such treatment unless one is dealing with a completely walled off appendiceal abscess. The postoperative progress of the patient can almost be forecast: a right rectus type incision was made, acute appendicitis was encountered, appendectomy usually done with a tedious stump inversion, drainage tubes were inserted; on the fourth postoperative day the patient began to develop signs and symptoms of a progressive small bowel obstruction produced by loops of small bowel wrapped around the drains; or a knuckle of small bowel made its appearance upon the anterior abdominal wall of this patient. After a day or so, this

patient was taken to the operating room and operated upon, and, lamentably, two days later a necropsy was performed.

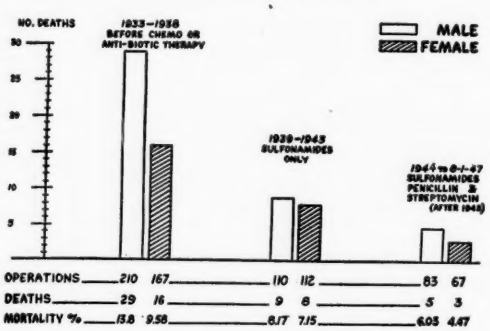
The continued incidence of pulmonary embolism as a factor in postoperative mortality in appendicitis is a matter of grave concern. The simple checking of the calves of the legs on visiting the patient postoperatively would, I am sure, put the surgeon on the alert to recognize when his patient was developing a bland phlebothrombosis. If the phlebothrombosis continued to spread despite the use of anticoagulants, an immediate prophylactic venous ligation near the foramen ovale in the upper thigh is indicated. Equally regrettable has been the failure of American surgeons to realize that the use of *papaverine hydrochloride intravenously* will save more than one-half of their cases of pulmonary embolism, *if* this is injected intravenously within two minutes after the onset of this dreaded complication and many a patient dies needlessly in the postoperative period because of a very small pulmonary embolus which has caused a constricting spasm in the pulmonary artery, but never actually blocked nor plugged the lumen of this large vessel. If the pulmonary arterial spasm can be quickly replaced by a complete vasodilatation, that patient will live. The hesitancy of many American surgeons to perform deliberate ligation of the vena cava near its origin in the area of the lower lumbar vertebrae is regrettable. It is a safe procedure and often life-saving. The table demonstrates the uniformity of results achieved by masterly inactivity.

In this study there were 10 fatalities due to pulmonary embolism in which the attending surgeon did not believe papaverine hydrochloride and atropine preparations were of any material value. Spasmalgin in 1.0-cc. ampules * is used routinely and is kept in sterile jars together with a 2-cc. syringe and a 22-gauge 1½-inch hypodermic needle.

Of great interest was the fact that only 12 (15.72 per cent) of the deaths in this series of 97 deaths had McBurney type incisions and that the average postoperative days in the hospital before death averaged three and one-half times longer than in cases in which more medially placed abdominal incisions had been employed. As a rule irrespective of the degree of inflammatory process present, the deaths in cases with McArthur incisions resulted from conditions other than bowel obstruction, wound evisceration or peritonitis. It appeared to me, therefore, that the data presented in Table 2 should be taken seriously to heart by American surgeons.

Table 3 presents graphically the postoperative deaths in acute gangrenous appendicitis

TABLE 3. MORTALITY RATE IN ACUTE PERFORATIVE APPENDICITIS.



with perforation. It is clear that specific chemotherapy and antibiotic preparations constitute a definite important contributing factor in the progressive lowering of postoperative mortality and morbidity and suggest continued improvement in future. The results suggest that in the future more lives will probably be saved by the postoperative employment of these preparations. The fact that there has not been a death from simple acute appendicitis since 1942 up to August 1, 1947 clearly demonstrates the value of these adjuncts to therapy. No death from acute or "chronic" appendicitis has occurred since 1945, and none from acute gangrenous perforated appendicitis since late in 1946. This corresponds roughly to the advent of streptomycin and our rising courage in the postoperative use of penicillin, thanks to Crile [13] and Wheatley.[50]

In Table 4 it will be noticed that abscesses, ovarian cysts, upper respiratory infections,

* This preparation may be obtained from Hoffman-La Roche, Inc., Nutley, New Jersey.

TABLE 4. NONFATAL COMPLICATIONS AT OPERATION: 5,372 CASES.

Complications	Types of Appendicitis						Totals	Incidence Per Cent
	Perfor. Gang. M	Perfor. Gang. F	Acute M	Acute F	Subacute M	Subacute F		
Abscesses	150	176	47	29	—	—	402	7.47
Ovarian cysts—various types	0	5	0	84	0	80	169	3.14
Upper respiratory infections	24	13	29	4	46	11	127	2.36
Uterine diseases	0	4	0	53	0	67	124	2.31
Adhesions	2	8	10	30	5	34	89	1.64
Fallopian tube diseases	0	2	0	51	0	29	82	1.52
Pregnancy								
A. Uterine	0	25	0	5	0	16	51	0.95
B. Ectopic	0	4	—	—	0	1		
Cervix—uterus diseases	—	—	0	12	0	33	45	0.84
Obstruction—small bowel	4	12	8	7	1	2	34	0.63
Cardiac diseases								
A. Myocarditis	2	1	0	2	10	5	29	0.54
B. Endocarditis	1	2	2	0	3	1		
Gall bladder diseases	3	10	1	0	6	4	24	0.45
Hernia—								
A. Inguinal	—	—	7	2	9	2	24	0.45
B. Femoral	—	—	1	3	—	—		
G. U. diseases	3	0	5	2	3	4	17	0.32
Peptic ulcer	1	0	4	1	4	2*	12	0.22
Alcoholism—acute	1	3	1	0	2	1	8	0.15
Pulmonary embolism	—	—	1	2	1	1	5	0.09
Osteomyelitis	—	—	1	0	0	1	2	0.04
Mesenteric thrombosis	—	—	—	—	1	0	1	0.02

* Perforated.

diseases of the uterus, and intraabdominal adhesions constituted the chief complications of appreciable importance. There was an accompanying salpingitis in approximately 1½ per cent of the patients operated on. In this group of 5,372 cases 51 patients were pregnant, 46 of which were uterine in location. The other complications are of interest. Only one case of mesenteric thrombosis that survived but 5 cases of nonfatal pulmonary embolism may be attributed to the prompt and energetic use of intravenous Spasmalgin.

Table 5 shows the important postoperative nonfatal complications in the order of their

TABLE 5. NONFATAL POSTOPERATIVE COMPLICATIONS IN 5,372 CASES IN THEIR ORDER OF FREQUENCY.

Complications	Types of Appendicitis						Totals	Incidence Per Cent
	Perfor. Gang. M	Perfor. Gang. F	Acute M	Acute F	Subacute M	Subacute F		
Toxemia	49	38	60	47	4	6	204	3.80
Peritonitis								
A. General	26	25	9	5	5	0		
B. Local	9	12	6	5	—	—	169	3.14
C. Type not stated	10	12	11	4	7	4		
D. Pelvic	1	4	2	10	1	1		
Cardiac disease . . .	14	18	23	9	5	6	75	1.40
Renal disease	17	9	11	6	14	9	66	1.23
Other G.U. diseases	2	8	10	5	9	15	49	0.93
Abscesses: Intra-abdominal	6	12	7	12	—	—	37	0.69
Pneumonia: Various types . .	5	1	14	10	0	1	31	0.58
Paralytic ileus	3	7	3	2	2	2	19	0.35
Infectious diseases.	2	0	2	0	9	3	16	0.30
Parotitis	1	2	3	3	1	1	11	0.20

frequency. Table 6 tabulates the unusual pathologic findings in the entire series of 12,813 appendices removed surgically.

SUMMARY

1. The peritoneal cavity should not be opened unless the surgeon is fully competent and able to cope with any acute inflammatory condition encountered therein. Any lower standard of proficiency than this will result in needless deaths and increased postoperative morbidity.

2. The McArthur (McBurney) incision is the incision of choice in performing an appendectomy.

3. This study has shown that the employment of an incision other than the McArthur muscle-splitting incision, has led to a marked increase in postoperative complications such as wound evisceration, ileus, peritonitis, toxemia and bowel obstruction. Incisions other than the McArthur incision have contributed to 80 or more per cent of all of the deaths in this group if the so-called "chronic" appendicitis cases are excluded.

4. The peritoneal cavity should not be drained, except under exceptional circumstances. The less experienced operators should avoid draining the general peritoneal cavity by means of rubber drainage tubes of various types. Only an appendiceal abscess which is completely walled off from the remainder of the peritoneal cavity can be drained safely without the development of postoperative complications some of which may prove fatal. Among these are adhesion formation, localized abscesses and small bowel obstruction due to loops of ileum wrapped around the drainage tubes.

5. The stump of the vermiform appendix should not be inverted as a routine procedure, as this is a definite factor in increased postoperative morbidity and fatal complications.

6. With the advent of specific sulfonamide chemotherapeutic agents and antibiotic preparations such as penicillin and streptomycin, there is no longer any valid reason for the

TABLE 6. UNUSUAL APPENDICEAL LESIONS IN 12,813 CASES.

Lesions	Types								Totals	Deaths
	Perfor. Gang.		Acute		Subacute		Chronic			
	M	F	M	F	M	F	M	F		
Diverticula	2	0	2	5	—	—	0	4	13	0
Mucocele	—	—	1	1	0	1	0	1*	4	1
Endometriosis	—	—	0	2	—	—	0	2 (1*)	4	1
Adenocarcinoma	1*	0	0	2	—	—	0	1	4	1
Tuberculosis	—	—	—	—	0	1	0	1	2	0
Lymphoma	—	—	—	—	0	1	—	—	1	0
Carcinoid	—	—	0	1	—	—	—	—	1	0
Totals	3 (1*)	0	3	11	0	3	0	9 (2*)	29	3

* Death.

employment of rubber drains in the peritoneal cavity as a means of successfully treating acute peritonitis whether localized or generalized.

7. The implantation of 5 Gm. (no more) of sterile sulfanilamide powder and 1,000,000 units of crystalline penicillin dissolved in 20 cc. of sterile distilled water is routinely employed in instances of peritonitis, either localized or generalized. These specific drugs are also placed in all appendiceal abscess cavities. Such individuals suffering from peritonitis are likewise given 100,000 units of crystalline penicillin intramuscularly every 3 hours and 0.37 Gm. of streptomycin dissolved in 5 cc. of triple sterile distilled water every 6 hours until the patient's abdominal distention has disappeared, flatus has been passed, a bowel movement has occurred and, finally, the temperature has remained at normal for 36 consecutive hours. Food and fluids are withheld during this same period, If this takes 10 days, the treatment is continued in this routine manner.

8. In the presence of peritonitis, localized or generalized, in which ileus is diagnosed preoperatively decompression is carried out by the employment either of a Levin nasal duodenal tube or preferably a Miller-Abbott tube immediately after surgical intervention. These suction tubes are then attached to a Chaffin-Pratt negative suction motor. The decompression tube is left in place until all evidence of the ileus and peritonitis has subsided irrespective of how many days it takes.

9. The use of pituitrin, pitressin and other drugs causing contractions of smooth musculature has been entirely discarded as being unsafe to use in the presence of ileus or peritonitis.

10. In cases complicated by peritonitis or appendiceal abscess the superficial layers of the anterior abdominal wound are left wide open with no effort made to suture either the external oblique aponeurosis, the subcutaneous adipose tissues, or the skin. Such wounds are left open until all evidence of infection has subsided and then secondary closure is done,

after the manner employed with great success in evacuation and general hospitals during World War II.

11. Early ambulation has no place in acute appendicitis with peritonitis and ileus. The criteria for allowing a patient out of bed in acute or gangrenous perforative appendicitis must be the disappearance of abdominal distention, a normal temperature for 36 hours, the passage of flatus, and a bowel movement.

12. A fecalith should always be carefully searched for in cases of acute perforated appendicitis.

13. The term "chronic appendicitis" is a misnomer as applied in the great majority of appendices so diagnosed. In reality it is a term often used by the pathologist to diagnose the normal involutionary changes commonly encountered in older individuals. A true continuing chronic inflammation of the vermiform appendix is exceedingly rare and occurs most frequently in the chronic infectious granuloma disease group.

14. Sharp, lancinating, right lower quadrant pain generally does not signify disease of the vermiform appendix. Great care must be used to make a correct and definite preoperative diagnosis of malfunction of the vermiform appendix.

15. A report is presented on 12,813 consecutive appendectomies performed at the Hollywood Presbyterian Hospital between 1933 and August 1, 1947. A large number of these (7,441) were diagnosed by the pathologist as "chronic" appendicitis. If for purposes of study this group is excluded, there remains a group of 5,372 cases of definite inflammation from which conclusions may be drawn. The mortality rate in this series, 9.2 per cent for 759 instances of perforated gangrenous appendicitis, is not excessive. This mortality rate has undergone progressive lowering in recent years. The mortality rate of simple acute appendicitis was 0.31 per cent in a group of 3,169 cases so diagnosed by the pathologist. There have been no deaths from this type of appendicitis since 1942. The mortality rate in 1,444 cases of subacute appendicitis was 0.63 per cent, and was attributed to the unusual number of severe postoperative complications: pulmonary embolism, acute cardiac dilatation and status lymphaticus. The mortality in the so-called "chronic" appendicitis group was 0.11 per cent and up to August 1, 1947 no individual so diagnosed and so operated upon has died in this hospital since 1945. Aside from the deaths attributable to the disease and its complications there was one death from bilateral lobar pneumonia, one due to coronary obstruction with subacute myocarditis, one caused by an embolism in the right auricle of the heart, one due to acute dilatation of the heart so proved at necropsy, and one due to cerebral hemorrhage.

CONCLUSION

1. Modern concepts in the better management of appendicitis haye been discussed.

2. The histories of 12,813 consecutive appendectomies performed at the Hollywood-Presbyterian Hospital, Hollywood, California, have been reviewed and their data tabulated. Certain lessons can be drawn from this study with decided profit to all surgeons.

SOMMAIRE

La cavité péritonealene sera pratiquée que par un chirurgien de haute compétence et ayant une connaissance nécessaire pour contrôler les états inflammatoires qui l'affronteront. Une connaissance inférieure résulterait en morts inutiles et en augmentation de morbidité postopérative.

L'incision "McBurney" est l'incision de choix pour l'appendectomy. Une étude soignée du sujet nous démontre que toute autre incision entraîne une augmentation des complications postopératoires et contribue à 80% de tous les décès de ce group excluant naturellement les cas désignés "appendicitis chroniques." Le drainage ne peut être fait avec écurité que dans les cas d'abscès appendiceal que, si cet abscès peut être isolé complèment du reste de la cavité peritoneale. Autrement le drainage de la cavité peritoneale a des dangers. Le moignon de l'appendice ne sera pas enfoui comme procédé routinier, car c'est une méthode qui peut entraîner des complications fatales. Avec la découverte des drogues chémotherapeutiques "sulfanilamide et penicilline"; il n'y a plus aucune raison valide pour l'emploi de drains de caoutchoucs dans le traitement de la péritonite aigüe. L'Implantation de 5 grammes (pas plus) de

sulfanilamide stérilisée dissous dans 200 cc. d'eau distilée et d'un million d'unités penicilline qu'on dissous dans 20 cc. d'eau sterilisée et distilée est l'emploi routinier en péritonite local ou généralisé. Les drogues jouent aussi un rôle important dans le traitement des cavités appendiculaires virulentes. Aux malades souffrant d'une péritonite on donne tous les trois heures une injection intramusculaire de 100,000 unités penicilline crystalesse et de 0.37 Gm. de streptomycine dissoute dans 5 cc. d'eau sterilisée, trois fois distilée, tous les six heures tant que la distention abdominale existante est là, et qu'il n'y a eu aucun passage de vents ou de matières fécales, et que la température est réstée normale pendant 36 heures consecutives. Les aliments et les fluides ne seront pas administrés pendant cette période même s'il est nécessaire de continuer cette routine pendant dix jours. Quand l'obstruction intestinale complique une péritonite on aura recours au tube Levin ou au tube Miller-Abbott immédiament après l'intervention chirurgicale. Ces tubes seront laissés en deneure, tant qu'il y aura évidence d'obstruction intestinale et de peritonite. La pituitrine et la pitressine et toute autre drogue causant des contractions musculares sont d'un emploi dangereux en présènce d'ileus ou de péritonite. Dans les abscès de l'appendice, les couches supérieures de la plaia antérieurs abdominale ne seront pas suturées (ces plaies seront laissées ouvertes tant que toute evidence d'infection n'a pas été supprimée; alors on emploira la fermeture secondaire employée avec grand succès dans la dérnière guerre). Avant que le malade puisse se lever après une opération pour appendice aiguë ou gangréneuse, on s'assurera que toute infection abdominale soit disparue, que la température ait été normale pendant six heures consecutive, qu'il y a passage de gaz et matières fécales.

Le terme appendicite chronique est une fausse désignation dans la grande majorité des cas. L'inflammation chronique de l'appendice est très rare. Dans 12,813 cas consecutifs d'appendicite, le patologiste, on fit le diagnostique d'appendice chronique dans 7,441. Il ne reste alors en evidence que 5,372 cas d'inflammation qui permettent de déduire des conclusions. Dans 759 cas d'appendicites gangreneux et perforées, il y a une mortalité de 9.2%. La mortalité de l'appendice noncompliquée fut de 0.31% dans un groupe de 3,169 cas. Dans les cas de ce type, nous n'eûmes aucun décès depuis 1942. La mortalité dans 1,444 cas d'appendice sub-aiguë fut de 0.63% et doit être attribuée à un plus grand nombre de complications postopératoires (embolie pulmonaires, dilatation aiguë cardiaque, status lymphaticus). La mortalité des cas désignés appendicites chroniques fut de 0.11% et nous n'avons aucun cas de mortalité dans les cas de cette nature, depuis 1.945 jusqu'a Aout 1947.

RIASSUNTO

Ritiene che l'incisione—per ogni caso di appendicite—debba essere quella di McArthur (McBurney). Altro tipi di incisione aumenterebbero le complicazioni post-operatorie e contribuirebbero perfino nell' 80% alla mortalita' (ad accezione delle appendicite croniche).

Il drenaggio va posto solo allorquando un ascesso appendicolare e' completamente isolato dalla cavita' peritoneale. Il moncone dell' appendice non dovrebbe essere mai invertite, perche' l'inversione aumenta le complicazioni post-operatorie.

Coll'avvento della penicillina e dei sulfanilaminici non rimarrebbe alcuna ragione plausibile per l'uso di drenaggi di gomma nella cura delle peritoniti acute. L'A. precisa le modalita' del trattamento chemioterapico, inclusa eventualmente la streptomicina.

Consiglia l'uso dei tubi di Levin o di Miller-Abbott, adattati ad apparecchi di suzione, nei casi di ileo complicante la peritonite, mentre sconsiglia l'uso di pituitrina e di altre sostanze stimolanti la motilita' intestinale.

Nelle peritoniti e negli acsessi appendicolari gli stratti superficiali (aponeurosi dell'obliquo esterno, sottocutaneo e cute) della parete addominale anteriore dovrebbero essere lasciati ampiamente aperti. La ferita dovrebbe rimanere aperta fino a che ogbi segno di infezione e' scomparso: solo allora una chiusura secondaria potrebbe essere istituita.

Sopra 12813 successive appendicectomie, il patologo ha trovato 7441 casi di appendicite cronica. Limitando la statistica a 759 casi di

appendicite gangrenosa perforata, la percentuale di mortalita' raggiunge il 9,2% : ma anche questa va progressivamente diminuendo. Nei casi di appendicite acuta, semplice, la mortalita' si riduce al 0,31% sopra un totale di 3169 casi (dal 1942 in poi nessun caso di morte). La percentuale aumenta al 0,63% in 1444 casi di appendicite subacuta. Scende al 0,11% nei casi di appendicite cronica; nessun caso di morte dal 1945 al 1947.

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Tourniquet Amputation*†

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TOURNIQUETS have been applied for centuries for the control of hemorrhage. In the second century A.D., Heliodorus [1] referred to its use in the control of bleeding during amputation of the extremities and many types of tourniquets have since been devised to suit the purpose for which they were intended. In all, compression was used for the sole purpose of controlling bleeding until surgery could be instituted, either by ligation or amputation. We have found no case reports in the literature previous to 1924 in which the tourniquet was applied for the purpose of limiting infection. At that time R. E. Farr,[2] with whom I was associated, reported three cases before the Minnesota Academy of Medicine. One case of gas gangrene of his own and one of the author's so treated survived almost overwhelming infection. The third, similarly treated for virulent infection superimposed upon arteriosclerotic gangrene in the presence of cardiac decompensation, expired from cerebral thrombosis after five days. The extremities were wrapped in formaldehyde solution distal to the tourniquet and encased in a rubber envelope.

We have now treated more than 20 cases by this method which we have modified and improved from time to time. The first decision and perhaps the most important one to be made is that the damage to the extremity is irreparable and that the limb must be sacrificed. Second, in the very poor risk patient in whom a primary classical amputation probably would be fatal, the tourniquet is applied as an expedient in the hope of saving life. Later, the second stage may be completed either according to our technic or, when the general condition of the patient will permit, by performing a classical amputation.

In 1924 the author started using as a tourniquet about 5 feet of ½-inch pure gum rubber tubing which is stretched very tightly and remains tight as it cuts deeply into the tissues. Pain usually is minimal as the pressure from the rubber tubing produces anesthesia of such degree that only moderate sedation is required.

Much has been written in recent years about refrigeration for anesthesia and for the preservation of tissue of impaired vitality. Refrigeration has been used with and without the tourniquet but we have continued to use formaldehyde solution because of the simplicity of its use and the fact that when the part is encased in rubber the process is odorless. We have repeatedly cared for patients so treated in large wards. Recently we used our technic in a Sisters' hospital where the leg had been treated for days by refrigeration. The contrast was convincing when they no longer had to carry pails of ice and water.

From his experience in the armed forces in World War I the author is convinced that many lives could have been saved by the sacrifice of an extremity by the tourniquet technic. We have so treated several patients whose extremities, one or more, have been traumatized so severely that amputation was inevitable. It is truly amazing to observe the minimal systemic reaction, the absence of shock and often the almost immediate improvement following the institution of this procedure. In 1941 I stated,[3] "During a recent trip south I saw an article in the San Antonio paper to the effect that an airplane pilot had crashed and sustained such a mutilating injury to both legs that double amputation was necessary. The article further stated that the pilot promptly died following the shock of the accident and the operation." We firmly believe that in war or peace, and especially in industrial and traffic accidents, the tourniquet technic affords a temporary expedient, a procedure of minimal severity, at a time when definitive surgery would be hazardous. The tourniquet may be left on for days and the rubber tubing will complete a guillotine operation without shock; or a

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secondary elective operation may be performed at an optimum time. Major Paul Adolph [4] states that in China they used the tourniquet to obtain preoperative improvement before amputation in the severely toxic patient who may have been lying out on the battlefield for two to three days. The lives of Chinese soldiers, whose extremities were badly mutilated and infected, were saved when the delimiting tourniquet was employed.

INDICATIONS

First, there must be the necessity for an amputation as a life-saving procedure in the presence of forbidding surgical risk. These indications all exist in the presence of (a) severe trauma with irreparable damage to an extremity of a patient who is suffering severe shock from loss of blood or the magnitude of his injuries; (b) in the presence of virulent infections, especially gas gangrene, and (c) in the presence of gangrene due to diseased peripheral circulation with superimposed infection, or concomitant diabetes or concomitant critical heart disease.

Necessary equipment consists of the following:

Pure gum rubber tubing, 5 feet.
White cotton, sterile, one roll.
Dental rubber dam, sterile.
New rubber draw sheet, one
Formaldehyde solution, 10 per cent, 1 gallon.
Roller bandage, 4-inch, one.

TECHNIC

The procedure may be employed either in the operating room or in the patient's bed. The latter has been found to be a decided advantage in critically ill patients with gangrene complicating diabetes or heart disease. We have repeatedly found intravenous morphine or morphine and scopolamine to furnish adequate anesthesia. Likewise, pentothal sodium has been very satisfactory.

The skin of the extremity is first painted with antiseptic solution several inches above and below the site of application of the tourniquet. The dental rubber dam or a strip of pure gum rubber, 6 to 8 inches wide and long enough to encircle the extremity and overlap a few inches, is placed so that its lower border is at the site of amputation. Next, the rubber tubing is tightly stretched and wrapped about the site of amputation just including the lower border of the rubber dam. Each turn of the tubing overlaps the one below so that the constricted area is as narrow as possible. The ends of the tubing are secured by tying together firmly so that they cannot possibly slip. The extremity distal to the tourniquet is next wrapped with a goodly quantity of white cotton. It is well to use the cotton in abundance. The new rubber draw sheet is next applied so that the extremity may be securely enclosed. The cotton is next saturated with about two quarts of formaldehyde solution and the closure in the rubber sheet completed and held fast with the 4-inch bandage. The rubber dam is next turned distally, sealing the upper opening of the wrapped sheet, and held securely by a few laps of the bandage. By this means the extremity below the tourniquet is preserved in a laboratory solution which renders the gangrenous part odorless, nor is there any odor from the formaldehyde. We have repeatedly cared for these patients in wards without complaint.

POSTOPERATIVE CARE

General supportive treatment may be carried out as usual. Transfusions and infusions may be used as desired, and antibiotics if indicated. There is no interference with the routine treatment for the patient's condition of shock, diabetes or heart disease. Mild sedation usually is adequate since, in only a few hours, the gradual compression of the tourniquet produces pressure anesthesia. This feature has almost been the rule although one or two patients have required greater amounts of sedation.

Usually once daily the rubber envelope is opened slightly and one to two pints of formaldehyde are added to assure against odor from the gangrenous part.

SECONDARY PROCEDURES

After the tourniquet has been applied and supportive treatment instituted the condition of the patient may improve to such a degree that the surgical risk is lessened. Two alternatives are then presented:

1. A classical amputation with flaps fashioned above the tourniquet. This is particularly applicable to crushing injuries not accompanied by severe debilitating disease. Naturally, it is the more rapid and the more ideal method with definitive stump in selected cases.

2. The continued action of the elastic rubber tubing for 8 to 10 days will compress a groove through all the soft tissues to the bone. There remains only a hard dry cuff over the bone, completely free of sensation. As a result, a Gigli wire saw may be placed in this groove immediately above the tourniquet and the remaining tissue and bone cut across without anesthesia. The result is a guillotine operation. Usually the skin edge and a layer of muscle eventually separate due to the crushing. Occasionally at this time we divide the bone several inches higher under local anesthesia and use adhesive traction to pull the soft tissues together. One may choose, however, to dress the stump aseptically and at a later date perform a plastic operation, removing adequate amounts of bone and muscle to permit the skin edges to be approximated loosely by through and through sutures. Though more time-consuming, the latter procedure will permit the saving of life in a larger number of amputations complicated by sepsis and severe debilitating disease.

MORTALITY

This procedure is an expedient made available in the critically ill patient in whom the classical operation of choice would be too hazardous. The application of the tourniquet and dressings produce no shock. In no patient have we observed any direct adverse symptoms. No deaths, I believe, can be attributed directly to the procedure when followed as described. One death occurred during anesthesia for severing of the painless compressed bed of the tourniquet. Most deaths have been due to the debilitating disease from which the patient suffered. Some who survived are, we believe, definite salvage attributable to the method.

Early in our experience we always had another tourniquet ready for possible secondary hemorrhage but none has ever occurred.

With the 6 cases previously reported [2, 3] and the present 14, there are 20 cases on record treated by this method. Statistics of the 20 cases indicate there have been six deaths, or a mortality of 30 per cent, none of which can be attributed to the method.

CASE REPORTS

CASE I. Mrs. E. J. was seen in consultation with the late Dr. W. Moir. This patient, 72 years of age, entered Asbury Hospital on Nov. 17, 1941. She had been a diabetic for years. For two months she had had a progressive gangrene of the left third and fourth toes. Blood sugar was 286 mg. per cent. On Nov. 27, 1941, an amputation was done by Dr. Moir at the tarsometatarsal joints, removing the gangrenous area. Infection aggravated her condition and her temperature rose to 103° F. on the third postoperative day. On the eleventh and twelfth postoperative days the patient was delirious. Temperature was 102° F. Sugar was very difficult to control.

On the twelfth postoperative day a tourniquet was applied in the patient's bed and the leg wrapped in formaldehyde dressings. Twenty-four hours later her temperature was normal, delirium had cleared and the diabetes was more readily controlled.

Ten days after application of the tourniquet the leg was amputated. The bone was divided at a higher level and the skin edges loosely approximated. This patient recovered and returned home about three weeks later with the stump nearly healed.

CASE II. Mr. K., aged 68, male, married, gave a long hisory of cardiac disease. His heart had been irregular for years. On Feb. 18, 1944, he stated that he had had a mild stroke two years previously. During the past year he was better and worked daily. This morning when he got up he began to have numbness in his right foot, then blanching and severe pain. He was hospitalized and an iliac embolectomy was performed by Dr. H. Hoffert and myself with complete recovery.

The patient developed the same symptoms with pain, numbness and cold right leg on Sept. 24, 1945. He was seen late by Dr. A. Cardle who stated that his heart was fibrillating and his condition was not good. When seen by me he had gangrene of his right leg. The electrocardiogram indicated the presence of (1) auricular flutter, (2) myocardial damage, (3) left axis deviation and (4) coronary disease.

On Sept. 28, 1945, the patient's condition was not good and he was complaining of very severe pain in his right leg. A rubber tourniquet was applied and the leg wrapped in formalin. During

the next two days the patient had almost no reaction and required only two hypodermic injections for relief of pain during the first 24 hours. Nine days postoperatively his condition had improved to such a degree that he was taken to the operating room and the amputation completed by Dr. Hoffert. The bone was divided at a higher level and adhesive traction brought the skin edges together. He was discharged from the hospital 13 days later with the stump partially healed. He was subsequently fitted with an artificial limb.

CASE III. Mrs. D., aged 73, entered St. Mary's Hospital Sept. 14, 1943. The history and physical examination revealed hypertension, left heart failure and severe diabetes. She had a gangrenous left foot which produced a severely toxic effect. Her electrocardiogram was normal but the x-ray revealed cardiac enlargement and pulmonary congestion. Sixty-five units of insulin failed to keep her urine sugar below 3 to 4 plus. She developed a severe infection, rapidly spreading into the gangrenous foot, and her temperature rose to 102° F. plus. On Sept. 21, 1943, a tourniquet was applied below the knee and the distal segment wrapped in formalin, encased in a rubber sheet. On Sept. 22, 1943, 24 hours later, her temperature was normal, she had no shock or ill effect and almost no pain from the application of the tourniquet. Nine days later the amputation was completed with a Gigli saw without anesthesia. There was more slough at the end of the guillotine stump than usual and one week later, when the patient's condition permitted, she was taken to the operating room and, under local anesthesia, the bones were divided at a higher level and skin flaps fashioned and loosely approximated. The patient recovered slowly and returned home with the stump nearly healed.

CASE IV. Mrs. J., reported through the courtesy of Dr. L. K. Buzzelle, was an elderly woman who had a severe heart attack in California. Several weeks later she was removed from a train in Minneapolis and taken to Asbury Hospital in a semiconscious state. She developed an embolic gangrene of the left leg and was in very critical condition. Because of her severely toxic condition, amputation was advised and because of her critical state, a tourniquet amputation was selected as the least hazardous.

A tourniquet was applied June 15, 1945, and the leg wrapped as usual. There was no shock or deleterious effect from the procedure and on the tenth postoperative day the amputation was completed. Traction was used on the skin of the stump. She weathered her surgery without event but five days later had a hemiplegia from which she expired. Autopsy revealed coronary sclerosis, arteriosclerosis, hypertensive kidney disease and, as the immediate cause of death, cerebral hemorrhage.

CASE V. Mrs. C. was seen in consultation with the late Dr. Salt. This patient, 49 years of age, married, was in a pitiful state when seen by me. She had sustained a fracture of the right hip which was treated by open operation and mechanical fixation with evident success. Subsequently it became necessary to remove the screws, and the wound later became infected. She developed an osteomyelitis with destruction of the neck and upper shaft of the femur. When seen by me the patient was a confirmed drug addict who cried out under the slightest examination. Her leg was flail and turned if not supported. Nursing care was a problem as she ate little and had fallen away badly in weight. It was almost impossible to turn her or care for her.

Amputation was advised but none believed she could tolerate an operation of election. As a result, a tourniquet was applied under pentothal sodium at a level 3 inches below the greater tuberosity on March 20, 1945. She had a stormy time for several days but 16 days later under the influence of morphine sulfate, the amputation was completed in the patient's bed. The leg healed slowly and two months later she was discharged from the hospital. The stump was nearly healed and she was no longer taking any drugs. She was eating well and had gained weight.

Case VI. Mr. F., male, aged 57, married, stated that he had had diabetes for nine years which was controlled by diet. He developed a sore on the outer side of his right foot three years ago which responded but little to treatment. Three weeks ago the foot became progressively worse with swelling and discoloration, and a moist gangrene involved the foot.

When seen by us he had a swollen, moist gangrenous foot with streaks extending well up the leg. On Jan. 13, 1946, his temperature was 101° F. and pulse, 100. Urine revealed sugar, 4 plus; his blood sugar was 258 mg. per cent; white blood count was 33,000. The next day his condition was worse and his temperature rose to 102° F. At that time the first stage of a tourniquet amputation was instituted. At the end of 24 hours his temperature was normal, pulse, 75 to 80 and the sugar in his urine was 2 plus. He required only one hypodermic injection in the first 24 hours and one daily controlled pain during the first few days.

Ten days later the patient's condition was excellent and a Gritti-Stokes operation was performed. There was little reaction to either operation and

the patient was discharged 16 days later with primary healing.

CASE VII. Mr. J. McM., aged 61, was admitted to the hospital quite toxic and incoherent. We obtained the information that he had had a painful foot for six weeks but had continued to work on a farm. During the past week the middle toe of the right foot became black and the pain was so great that he could not be up and about. When seen by me he was very toxic, confused mentally and complained of intolerable pain in his foot and leg. He presented a swollen right leg with a typical picture of moist gangrene extending to just below the right knee. Cellulitis was starting up the thigh. His blood sugar was 188 mg. per cent but he had 3 plus sugar in his urine.

On Dec. 31, 1947, the first stage of a midthigh tourniquet amputation was performed. He experienced no shock and no noticeable ill effect. His blood pressure remained 120/60 throughout. Six days later the amputation was completed without anesthesia and a sterile dressing applied over a guillotine stump. One week later when the patient was up in a wheelchair he suddenly expired from coronary occlusion.

CASE VIII. Mrs. K., a middle-aged woman who was in excellent condition, was skillfully operated upon by another surgeon for a fibromyoma of the uterus. Four days later she developed severe pain in her right leg with blanching, numbness, and reduced temperature; pulsation in the arteries of her foot was absent. An embolectomy was done but gangrene developed. Two days later a guillotine amputation was done 6 inches below the knee where the circulation seemed good. The stump became septic and the flaps sloughed. She had chills and severe reactions from all transfusions and one month after the embolectomy she became delirious, with temperature to 103° F. and pulse 140. Her condition was so serious that she undoubtedly could not have stood a surgical midthigh amputation. A rubber tube tourniquet was applied and the temperature fell and delirium improved. She continued to have pain, however, and her condition remained poor so that when her temperature again rose to 102° F. she was taken to surgery and, under general anesthesia, a guillotine amputation was completed. Although her convalescence was stormy and slow she made a complete recovery. In this instance I believe the tourniquet delayed amputation and improved her general condition enough to permit a successful guillotine operation.

CASE IX. This patient, a male aged 75, entered the University of Minnesota Hospital in very poor condition. He was completely studied and unrelated findings will not be reported. His hospital diagnoses were (1) diabetes, (2) arteriosclerosis, (3) coronary heart disease and (4) gangrene of left leg. The patient complained bitterly of pain in the gangrenous leg, his temperature was moderately elevated and there was mild sepsis.

Morphine and scopolamine were administered intravenously; a tourniquet was applied and the leg wrapped in formalin. There were no unusual reactions but the patient's temperature remained elevated and the roentgenogram suggested the possible cause to be pulmonary. During the completion of the second stage under anesthesia, the patient expired. The autopsy revealed acute atelectasis to be the immediate cause of death.

CASE X. The reports of this and the following cases are made through the courtesy of Dr. R. Pogue, Watertown, Minnesota.

This elderly, very frail female, aged 75, a severe diabetic, developed gangrene of her left foot. She suffered severely for a long time and was confined to her bed because her family objected to amputation. She became moderately septic with 4 plus sugar in her urine and which was controlled with difficulty by insulin. I do not believe an elective midthigh amputation could have been done successfully on this poor-risk patient. As a result a tourniquet was applied, there was no reaction and her insulin requirement dropped instantly. Ten days later her condition was greatly improved and the second stage was done under local anesthesia, dividing the bone at a higher level and bringing the skin loosely together. She had excellent healing and made a splendid recovery.

CASE XI. This patient, a male 68 years of age, in January, 1947, complained of severe pain in his left foot where he had developed two ulcers. The patient was a severe diabetic with 4 plus sugar in his urine, poorly controlled with large doses of insulin. The infection progressed and his temperature rose to 102° F. On Feb. 20, 1947, a rubber tube tourniquet was applied 6 inches below the knee and the leg wrapped in a rubber pillow filled with chopped ice. Almost immediately his temperature returned to normal and the insulin requirement was cut by half. Eleven days later, after intravenous administration of morphine, the leg was severed with a Gigli saw. Insulin was discontinued and the patient experienced an uneventful recovery.

Of unusual interest in this case was the fact that Dr. Pogue was away and instructions were given over long distance to his associate who had never seen the method employed.

CASE XII. Mr. L. B., 70 years of age, married, was a printer by trade. He entered the hospital because of unbearable pain in his left foot and leg. He states that he had repeated anginal attacks since 1942 and one and one-half years later suffered a right hemiplegia. His hospital diagnoses were (1) arteriosclerotic heart disease, severe, (2) thrombosis of left femoral artery, (3) dry gangrene of left heel and toes of left foot, and (4) hemiplegia, right, secondary to cerebral embolism. On Jan. 31, 1947, under morphine and scopolamine given intravenously, a rubber tube tourniquet was applied. His temperature remained elevated and he expired four days later. Autopsy revealed (1) bronchopneumonia, (2) coronary sclerosis, generalized, (3) arteriosclerosis, generalized.

CASE XIII. This case is reported by courtesy of Dr. W. White.

This male, aged 78, had suffered from (1) generalized arteriosclerosis, and (2) coronary arteriosclerosis and senility. He developed an acute coronary occlusion and was bed-fast. He fell out of bed and injured his left leg. The injury was followed by numbness in the leg for several days, and then by the development of an acute gangrene with very severe pain. Because the disease was progressive and pain almost intolerable, amputation was advised.

A rubber tube tourniquet was applied just above the knee. Eight days later the amputation was completed. The patient lived five days longer and expired in a state of general exhaustion and loss of strength.

CASE XIV. This is probably one of the outstanding cases of this series and proves the value of the method in trauma.

The patient, male, aged 65, was crossing the railway tracks to his place of business when he was hit by a locomotive engine. He was taken to the Minneapolis General Hospital in severe shock, where he was given 750 cc. of pooled plasma. He was then transferred to Asbury Hospital where he entered our care.

Examination revealed the following injuries: (1) Crushing of the right foot with extreme mutilation of the tarsal and metatarsal bones. (2) Dislocation with compounded injury of the left ankle. (3) Fracture of the right pubic ramus, of the right ilium, and separation of the right sacroiliac. (4) Fracture of the neck of the left femur. (5) Vertebral processes fractured on the third and fourth lumbar vertebrae. (6) Fifth, sixth and seventh ribs on the left side fractured and the sixth and seventh ribs on the right side fractured.

Plasma and blood transfusions were administered together with other supportive measures and as soon as his condition would permit, a debridement of the left ankle was done. The left ankle joint which was widely open, was freely irrigated. The dislocation was reduced and the wound closed with only a small drain. To maintain reduction of the ankle and at the same time keep the fractured femoral neck from displacing, a Kirschner wire was passed through the left os calcis and traction applied. We were convinced that surgical amputation of the irreparable right leg might well result fatally in one so severely injured. We applied a rubber tube tourniquet about the junction of the lower and middle thirds of the calf and wrapped the distal portion in a formalin dressing in a rubber sheet. The patient responded well to supportive treatment and on the eighth day the leg was severed with a Gigli saw without anesthesia. Eleven days later he developed a severe thrombophlebitis involving the left leg. Ten days after the onset of the phlebitis we did an open reduction of the left hip and anchored the fractured ends with three large screws.

One month after the injury the left ankle was healed, the right hip had been secured by internal fixation and the guillotine stump of the right leg was healing well. One hundred days after the administration of the pooled plasma he developed acute infectious jaundice. The guillotine stump eventually was closed by a minor plastic operation under local anesthesia.

It is now one year since the accident and the patient is quite well and wears a well fitting artificial leg. The left hip also is firmly united.

Since writing this paper a report has been received from the Minneapolis General Hospital through the courtesy of Dr. E. A. Regnier, in which it is stated that the tourniquet was applied in 20 cases with 16 deaths, or a mortality of 80 per cent. The high mortality rate is due to the fact that the tourniquet operation was used only in almost moribund cases who would tolerate only ice anesthesia and in whom general or spinal anesthesia were definitely contraindicated. They also conclude, however, that in no case could death be attributed to the use of the tourniquet.

CONCLUSIONS

The tourniquet amputation is an expedient to be used in those cases in which an extremity must be sacrificed but in which a classical amputation would be extremely hazardous in

the presence of forbidding surgical risk. The tourniquet may be used for a few days only at which time a classical operation may be done if the improvement in the patient's physical state warrants, or it may be allowed to remain on until a guillotine amputation has been accomplished except that it is necessary only to divide the insensitive, compressed tissue and bone. The odor from the gangrenous extremity is prevented by the use of formaldehyde solution. We are convinced by our own experience that by this method lives have been saved which might otherwise have been lost.

SOMMAIRE

L'emploi pour amputation de tourniquets est un expédient qu'on peut employer dans le cas où une extremité doit être sacrifiée ou même dans lesquelles une amputation classique est dangereuse vue la présence de risques chirurgicaux interdits. Le tourniquet peut être employé pendant plusieurs jours et s'il il y a amélioration de l'état physique du malade, il sera permis de faire une opération classique. On peut laisser le tourniquet en place jusqu'au moment où l'amputation guillotine sera accomplie, et alors il sera nécessaire de diviser les tissus comprimés et l'os ou les ós. L'odeur de la gangrène peut-être controlée par l'emploi d'une solution de formaldehyde.

Notre expérience nous a convaincus que cette méthode permet de sauver des vies qui autrement seraient perdues.

RIASSUNTO

L'amputazione con il laccio elastico e' un espediente al quale si puo' fare ricorso nei casi in cui un'estremita' deve essere sacrificata, ma nei quali un' apuntazione chirurgica immediata riuscirebbe troppo pericolosa.

Il laccio va applicato solamente per pochi giorni, fino a che un'amputazione classica puo' essere eseguita in vista delle migliorate condizioni generali, oppure fino a che i tessuti morti, divenuti insensibili, possono essere semplicemente asportati. L'odore proveniente dalla gangrena puo' essere prevenuto dall'uso di soluzioni di formaldeide.

L'A. si dichiara convinto che con questo metodo numerose vite—altrimenti sacrificate con interventi chirurgici intempestivi—sono state invece risparmiate.

SUMARIO

La amputación fisiologica por medio del torniquete es un procedimiento que se debe de usar en todos los casos que es posible practicar una amputación clasica debido al estado serio del paciente. El torniquete se debe de aplicar por unos pocos días y hasta que la condición del paciente haya mejorado lo suficiente para permitir la intervención quirurjica. El mal olor que proviene de la extremidad gangrenosa se puede evitar con el uso de una solución de formalina. En nuestra experiencia, este metodo ha salvado vidas que de lo contrario se habrian perdido.

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Preliminary Ileostomy as an Important Aspect of Colon Surgery Based on Thirty Years of Clinical Experience*

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IN no field of abdominal surgery has there been so much progress in the last 25 years as in colon surgery. Our statistics show that the mortality rate in 450 cases of three-stage colon resections with preliminary ileostomy performed before 1941 was as low as 2 per cent. The mortality rate in 150 cases with two-stage resections during this period varied between 10 to 15 per cent. With the use of sulfasuxidine in 1941 the mortality rate in 300 colon cases with primary resections was somewhere between 1.5 and 2.5 per cent, but we continued to use the three-stage operation with preliminary ileostomy whenever indicated. In 150 cases of colon resections after 1941 results were the same as with primary colon resections with chemotherapy. The mortality rate in 600 cases with three-stage colon resections was no higher than the mortality rate in 300 cases of primary colon resections with chemotherapy.

At first, because of the risk of infection in colon surgery, operations such as the two- or three-stage Mikulicz procedure were advocated in which the colon and the cancerous portion of the bowel were exteriorized and the growth, as well as the bowel adjacent to the growth resected. Results indicated, however, that the Mikulicz procedure was not very satisfactory since it is often impossible to exteriorize the lesion in individuals with short and fatty mesentery and a round abdomen. Since wide resection could not be accomplished, this operation was almost entirely discarded because of a higher incidence of infections of the abdominal wall and within the peritoneal cavity, local abscesses as well as a higher percentage of local recurrence of the carcinoma from mesenteric glands which could not be excised.

Following the Mikulicz procedure, an operation known as obstructive resection was developed in which the carcinomatous portion was exteriorized and resected with obstructive clamps. This procedure also was unsatisfactory because in many instances insufficient bowel was resected on each side of the lesion, with local recurrence of the carcinoma as a result.

Finally, the operations of preliminary cecostomy and transverse colostomy were devised to divert the fecal stream, permitting wide resection of the cancer and the adjacent colon with all the involved mesentery. These operations have certain other disadvantages. Since the fecal current can be only partially sidetracked, both procedures are followed by a large percentage of complications at the site of resection and anastomosis. As a result, the tissue of the bowel breaks down and intraperitoneal abscesses develop which often require further extensive surgery.

Simple Loop Ileostomy. Our experience with simple loop ileostomy dates from 1914 and 1915. We have used it not only as a preliminary operation for resection of the colon for carcinoma in preference to the customary transverse-colostomy or cecostomy, but also for injuries to the colon from bullet and gunshot wounds, as a method of decompression for an acute obstructed colon, and for severe acute terminal ileitis, ileocolitis, ulcerative colitis and ruptured diverticuli. It is a very simple procedure and surpasses cecostomy or transverse colostomy for the following reasons: (1) it achieves the decompression much better than the other procedures; (2) there is less risk of infection from the spilling of contents into the abdominal wall or peritoneal cavity; (3) it shuts off the fecal current completely; and (4) the results are more satisfactory.

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Simple loop ileostomy can be carried out through a gridiron incision and the closed wound then surrounded with vaseline around the ileostomy. The ileostomy is opened transverse to the longitudinal axis 4 inches from the ileocecal valve, and the colon decompressed before the patient leaves the operating table.

We have found that if an ileostomy is done for stab or gunshot injuries of the left side of the colon, the infection is arrested and the temperature subsides. The ileostomy causes the distended colon as well as the ileum to contract and collapse, shuts off the fecal stream through the colon and prevents the passage of the end products and gases of the infected colon through the infected wound. We have always used it in advanced cases of peritonitis, especially those in children, where there is a marked distention of the small bowel as well as the large bowel. It collapses the ileum as well as the colon, the patient becomes less toxic and the infection subsides.

One of its greatest values is as a preliminary operation in ulcerative colitis. If done early enough, it may even save the colon, and the ileostomy can be closed several years later.

There is probably no condition where it has shown more brilliant results than in late and undiagnosed cases of ruptured diverticuli of the left side of the colon where a severe infection is present in the abdomen. Our statistics show that if an ileostomy is done immediately, in addition to drainage of the left side of the abdomen, many lives may be saved.

It is also of great value in cases of neglected obstruction from an annular carcinoma or other pathology. We prefer it to cecostomy or transverse colostomy since it is simpler to lift out a loop of ileum than the cecum. The cecum usually is so distended that it ruptures when it is brought out of the abdomen or, when it is opened, recedes so quickly that some of the contents spill into the peritoneal cavity. These difficulties are not encountered when a simple loop ileostomy is done since the colon is decompressed with a rectal tube through the ileocecal valve while the patient is still on the operating table.

Chemotherapy. The mortality in colon surgery has been lowered with chemotherapy since it permits a primary resection of the affected bowel by the closed method after oral administration of sulfasuxidine and sulfathalidine 5 to 10 days before surgery. This was most satisfactory except in cases of annular constricting carcinoma with marked narrowing of the bowel lumen and marked hypertrophy and inflammation of the bowel wall above the carcinoma. In these cases, even with sulfasuxidine and sulfathalidine, the anastomosis often leaks and an infection occurs in spite of chemotherapy. Therefore, if there is the slightest question about the viability of the bowel and its ability to heal after primary resection and anastomosis, we always perform a temporary ileostomy in addition to the resection in order to safeguard the anastomosis, prevent infection and a long delayed recovery due to wound infections or local abscesses.

Even though we have achieved excellent results with the primary closed method of colon resection in conjunction with chemotherapy, we feel that too much stress has been laid on the value of sulfasuxidine and sulfathalidine in colon surgery while ignoring other valuable adjuncts to therapy. Important preoperative measures such as thorough cleansing of the bowel with oil retention enemas, magnesium sulfate, and suction apparatus, have not been properly or adequately emphasized.

Rectosigmoid Resection. We also believe in very extensive resections of low rectosigmoid carcinomas, and have found that in many cases it is much easier to do an open anastomosis after the resection of the mass in preference to a closed resection. Preliminary ileostomy, or ileostomy at the time of resection is important in these cases since there is less danger of complications from wound infections, and local abscesses in the pelvis. We feel that preliminary ileostomy is invaluable to the general surgeon who does just an occasional colon resection.

In complicated cases where massive resection is necessary not only of the colon but also of adjacent organs when these are involved (kidney and spleen, loops of small intestine grown into the mass, stomach) it is most advantageous to perform a preliminary

ileostomy or an ileostomy at the time of resection since it shuts off the fecal current. This is especially so if the patient is in poor condition. After a period of 10 days to two weeks of preoperative therapy with sulfasuxidine and sulfathalidine, a radical resection can be done. Irrespective of chemotherapy, ileostomy is of great value in these cases.

In older, poor surgical risk patients with extensive lesions of the colon, ileostomy is an important preliminary procedure since it allows the surgeon to do a radical resection with a primary anastomosis two or four weeks after the inflammation around the carcinoma has subsided. After careful roentgenologic examination the closure of the ileostomy can be carried out six or eight weeks later.

Our statistical records show that even before the advent of sulfasuxidine and sulfathalidine our mortality rate was very low as compared to results with other procedures. We feel that this is not due to superior surgical skill so much as to the following factors: (1) preliminary ileostomy does away with the complications such as abscesses and leakage from the anastomosis which occur in colon surgery; (2) preliminary ileostomy permits the inflammatory part of the process to subside so that the anastomosis is made in a more normal bowel; (3) it makes the limits of error much wider; and (4) it gives the finest results and the lowest mortality.

CONCLUSIONS

1. Preliminary ileostomy or ileostomy performed at the time of resection has given us as good results as the closed method with sulfasuxidine therapy as adjunct. While we use the closed method with sulfasuxidine whenever possible, we feel that it has its limitations in extensive lesions that have perforated or where the adjacent organs such as the kidney, spleen, or several loops of small intestine are involved.

2. For the average surgeon who only occasionally performs a colon resection, it is much safer to do a preliminary or conjunctive ileostomy with his resection. With preliminary ileostomies the patient's stay in the hospital is no longer than in cases of primary resections followed by abscesses or a breakdown of the anastomosis.

3. The preoperative preparation of the patient with glucose, saline, proteins, blood, and careful irrigation of the bowel are just as important as chemotherapy.

4. It is essential to delay operation until the patient is in the best possible condition.

SOMMAIRE

Iléostomie préliminaire ou iléostomie faite au moment de la résection intestinale nous a donné d'aussi bons résultats que la méthode fermée adjointe à thérapie sulfasuxidine.

Quoique nous employions la méthod fermée avec succès chaque fois que c'est possible, nous savons qu'elle a ses limitations dans les lésions étendues qui ont perforé ou quand des organes adjacents tel que le rein, la rate ou des anses intestinales sont envahis par le néoplasme. Pour le chirurgien ordinaire qui ne fait des résections du colon que rarement, il est préférable de faire une iléostomie préliminaire conjoinement avec la résection. Avec l'iléostomie préliminaire, le séjour à l'hôpital n'est pas plus prolongé que dans les cas de résections premières compliquées d'abcès ou de rupture de l'anastomose. La préparation préopératoire du malade à l'aide du serum-artificiel, du glucose, de proteine, peut-être de transfusion sanguine et l'irrigation de l'intestin est aussi importante que la chémothérapie.

Il est essentiel de retarder l'opération jusqu'au moment où le malade est dans les meilleures conditions possibles.

RIASSUNTO

1. L'ileostomia preliminare o l'ileostomia eseguita al momento della resezione hanno condotto—presso a poco—agli stessi risultati della chiusura immediata con il sussidio della terapia sulfasuccidinica. L'A. ritiene che la chiusura dell'intestino debba essere evitata nelle lesioni perforanti, nelle lesioni interessanti parecchie anse intestinali, oppure allorquando queste coinvolgano gli organi vicini, come la milza od il rene.

2. Qualora il chirurgo non abbia una larga esperienza nelle resezioni coliche, e' preferibile ricorrere ad un'ileostomia preliminare o con-

temporanea alla resezione. La degenza dei pazienti non supera quella nei casi sottoposti ad una resezione primario, seguita da ascessi o da una separazione successiva delle anostomosi.

3. Il trattamento pre-operativo con glucosio, soluzioni saline, proteine, sangue, prudente irrigazione dell'intestino, e' altrettanto importante della chemioterapia.

4. E' necessario ritardare l'operazione fino a che i pazienti abbiano raggiunto il massimo miglioramento delle condizioni generali.

SUMARIO

La ileostomia preliminar o practicada al tiempo de la resección intestinal da tan buenos resultados como el metodo cerrado combinado por la terapeutica con la sulfasuccidina. Aunque el último metodo es el preferible sin embargo tiene sus limitaciones en los casos con leciones extensivas que hayan perforado o invadido los organos vecinos, tal como los rinones, el bazo, etc.

Para el cirujano que aun es novicio en la cirujia del colon, la ileostomia preliminar es preferible a la resección primaria.

La terapeutica pre-operatoria es tan importante que la quemoterapeutica y debe de incluir las transfuciones con glucosa salinas, proteicas o de sangre asi como las irrigaciones intestinales que deben de hacerse con cautela.

La cirujia operatoria debe de llevarse a cabo solo cuando el paciente este en buenas condiciones.

A New Operation for Sliding Hernia

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ONE of the most difficult of hernias to repair, because of its peculiar anatomy, is what is commonly known as sliding hernia—*hernie englissade*. Properly it should be referred to as "prolapse of the colon." The hernia does not actually "slide."

In many instances tragic contretemps have been the result of failure to recognize certain cardinal principles underlying the repair of this uncommon variety of hernia which is a trap for the unwary. A clear understanding of the congenital factors involved and the urgency of the problem is absolutely essential. The surgeon often has moments of anxious speculation. Great perspicacity and surgical precision are then demanded of him.

A careful study and survey of the anatomy of sliding hernia and an analysis of the technic utilized in mobilizing the large bowel, be it cecum or sigmoid, are important factors in the surgical procedure designed to correct the hernia in question.

In closing an inguinal defect it is desirable to obliterate as much as possible of the gap without encroaching too closely on the spermatic cord and its component structures, particularly the internal and external spermatic and deferential vessels, the pampiniform plexus and the vas deferens. When a sliding hernia is found, the careless utilization of structures in the surgical field is fraught with dire consequences. In the past many ingenious repairs were suggested, to no avail.

ANATOMY

When a peritoneal investing layer possesses a sessile attachment to the posterior abdominal wall, the enveloped organ is referred to as "retroperitoneal" (vide, the pancreas or retroperitoneal part of the duodenum). However, when the peritoneal attachment is still narrower, the organ is considered to be without a mesentery and partly extraperitoneal. Finally, in examples where an organ is almost completely invested so that the two leaflets of the peritoneal sheath are nearly in contact posteriorly, it is considered possessed of a mesentery.

The cecum and appendix frequently possess a complete peritoneal investment so that they lie free in the right iliac fossa. The usual line of fixation of the ascending colon starts at the beginning of that viscus.

The organs usually found in a "sliding hernia" are either the large intestine (cecum on the right and iliac colon on the left) or the urinary bladder. As a rule the first is found in longstanding oblique hernias, commonly on the right side. Some eminent authorities contend that the highest incidence of this type of hernia is on the right side of the body. When the surgeon is confronted with a longstanding hernia which is not easily or completely reducible presurgically or at operation, and in which a complete repair of the inguinal canal clearly is indicated, he should be acutely aware of the possibility, and ready to cope with, the surprise of a "sliding hernia." Then, too, when the inguinal canal is opened, there is a noticeably large amount of fat surrounding the hernial sac. The sac proper is of increased thickness and there is likewise an increased vascularity of the parts. A presurgical roentgenographic examination, following a barium enema, will reveal the presence of the colon or sigmoid in the hernia sac. Fluoroscopic manipulation is also of value in making the diagnosis.

The bladder, or part of it, not uncommonly is found on the medial side of the neck of large, longstanding, oblique hernias. When there is a distinct thickening of the hernial sac medially, and occasional muscle fibers and large veins are to be seen, the bladder region should be thoroughly palpated with the examining finger in the neck of the sac. Urinary bladder hernias are always found closer to the medial abdominal line than other varieties. Usually it is a complication or an integral part of an inguinal hernia.

Classification. There are four varieties of prolapse of the colon:

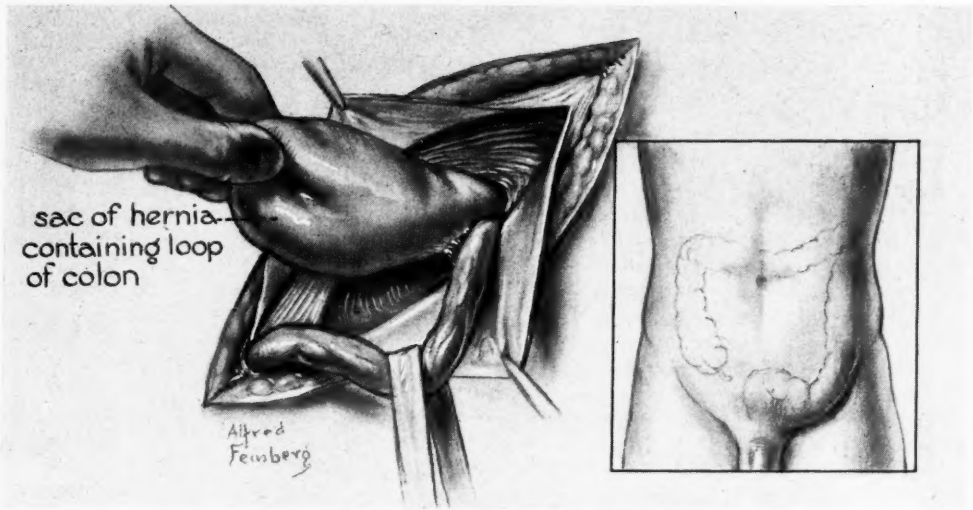

Fig. 1. Sliding hernia, left side.

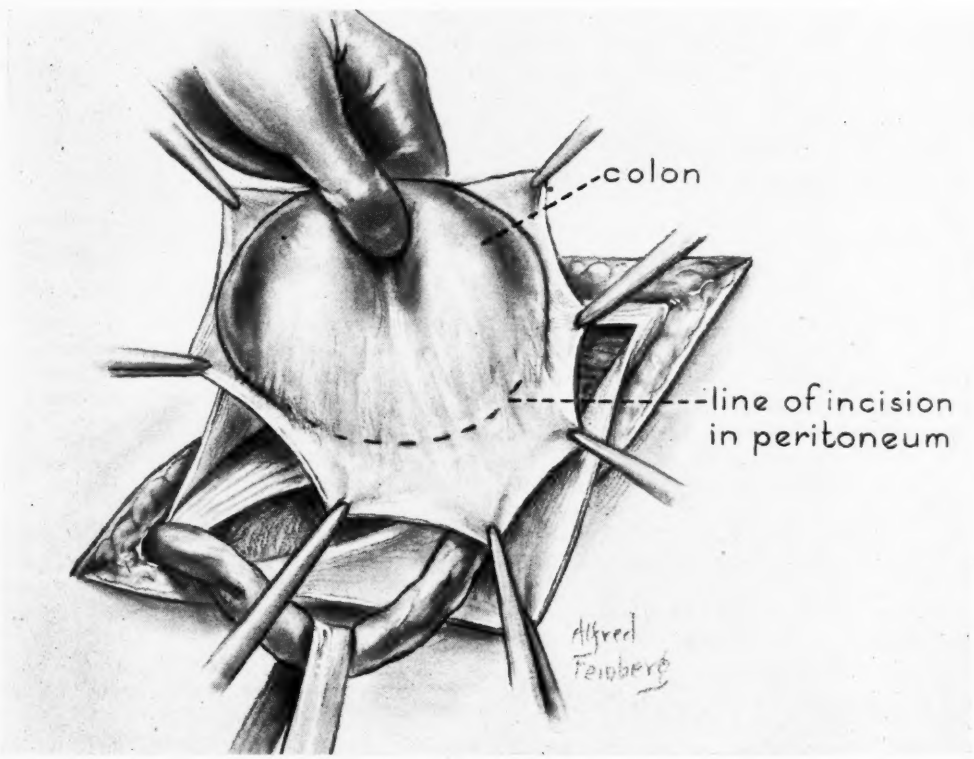

Fig. 2. Visualization of anatomy after opening sac. Note line of incision.

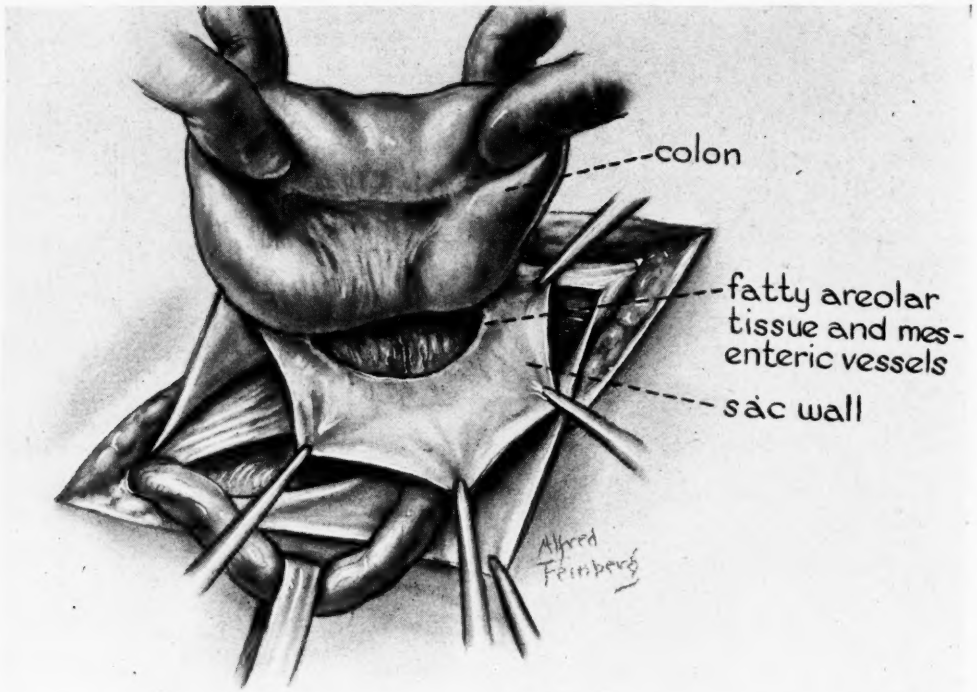

Fig. 3. Release of colon in the manner of a first stage Mikulicz procedure without severing mésenteric vessels.

1. Mobile cecum lying low in the pelvis with a relaxed mesentery, and very loose retrocecal and retroperitoneal areolar tissues.

2. Mobile cecum presenting the same pathology as (1), but the cecum and even the appendix enter a preformed open funicular process of peritoneum in the inguinal canal.

These two classes are present where there is a definite mesentery.

3. A cecum that has a broad attachment resembling mesentery may prolapse sufficiently to appear at the deep inguinal ring. The sac is incomplete posteriorly over the unattached area of bowel. This variety occurs in a cecum with a broad mesentery and eventually may become similar to the next class.

4. When the prolapse is complete, no real sac is present and there is no mesentery, the cecum being almost completely extraperitoneal —with its serous peritoneal covering intact— and appearing at the deep inguinal ring. The bowel may readily be mistaken for a hernial sac and inadvertently opened.

In the repair of sliding hernia attention must be given particularly to Classes 3 and 4.

In Class 2, no more difficulty is experienced than in the usual hernia operation.

In the third form there is a deficiency in the sac posterolateral to the cecal wall, which presents. There are two hazards in attempting to ligate the sac high up. One is an accidental puncture of the cecal wall, and the other—and more common—is the danger of encroaching on the posterolateral aspect of the cecum, and of ligating the cecal vessels.

In the fourth variety, an additional hazard is the failure to recognize a cecal bulge as cecum, under the impression that the sac is presenting, thus incising or plicating the gut with the dire possibility of gangrene.

It should be emphasized that the bowel involved on the left side is almost always *iliac*

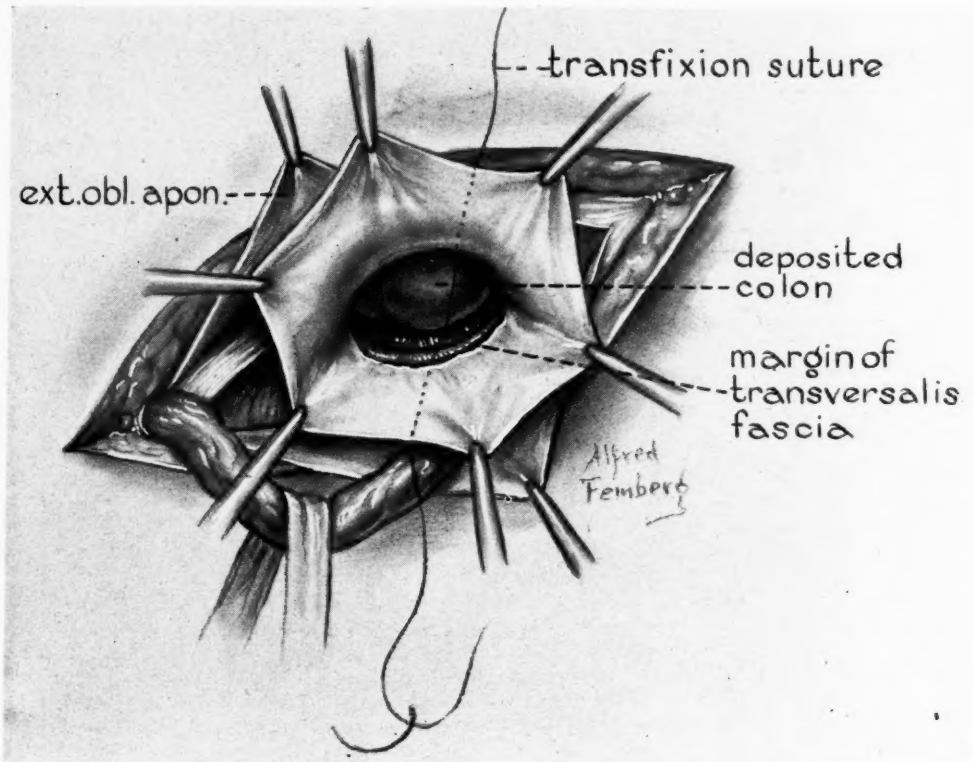

Fig. 4. Transfixion suture inserted as described in text. Note colon reposited into peritoneal cavity.

colon, and *not* sigmoid colon (which possesses a mesentery and would descend into the sac and not behind it), as is often stated.

SURGERY

In the past the hernial sac was transfixed distal to the intestine in order to obviate injury to the subjacent attached bowel. Thus, only a small segment of the sac was removed. When it was found that a certain part of the sac did not slip back easily it was widely and circumspectly opened. Resistant adhesions usually thickened the sac wall and the bowel remained anchored in the sac cavity (Fig. 1).

In Figure 2 it is obvious that there is no real mesentery on the inferolateral aspect of the bowel. The visceral peritoneum is continuous with the lower sac wall, forming a sessile continuation. The condition is due to the fact that this variety of hernia, in reality, is purely a "prolapse."

When the sac and its contents have been completely freed up to the deep inguinal ring the separation of the bowel, so far as possible, is continued into the iliac fossa. The peritoneum is also separated in part, and the bowel and peritoneum are drawn into the wound. The sac is now opened widely, being careful to avoid injury to the contained viscus.

If the colon can be liberated by incising the visceral peritoneum at the angle where it becomes continuous with the peritoneum forming the sac, the bowel can be mobilized freely as is done in the first stage of a Mikulicz procedure. Care must be taken to avoid injury to the subjacent mesenteric vessels which are present in the areolar and fatty tissue between the two layers of mesentery. The colon is then

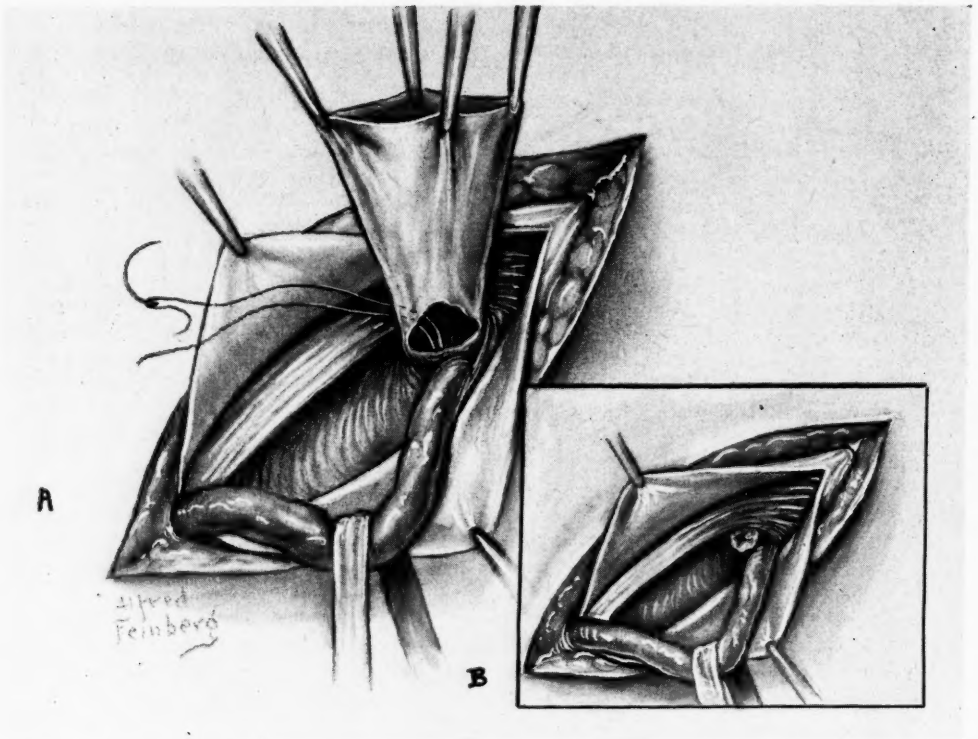

Fig. 5. A, Another view of transfixion suture. B, Stump after resection of redundant portion of sac.

easily placed within the peritoneal cavity (Fig. 3).

The neck of the sac is then clearly visualized. There is some deficiency of peritoneum at its inferior margin where it is in contact with the adjacent transversalis fascia. But these structures are attached to each other by firm synechiae. This small aperitoneal angle may therefore be treated as one structure. The neck of the sac is then transfixed (Figs. 3, 4, 5) and the redundant part removed.

A standard technic is then utilized to complete the operation, preferably a modified Wyllys Andrews hernioplasty. In a few patients with "sliding hernia," in addition to the operation described, I have removed the spermatic cord structures in order to close the inguinal canal completely.

This operation has been performed in 12 patients with excellent results; in ten, the pelvic colon was discovered and in two, the cecum.

To date there has been no wholly satisfactory surgical procedure for "sliding hernia." In my experience recurrences have been frequent. Because of the danger of encroachment on the blood supply, a satisfactory repair is difficult. The new procedure described has been found adequate.

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A Massive-Resection Operation for Varicosities of the Leg Without Massive Sclerosing Therapy

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THE subject of leg varicosities is an evergreen one. The spate of publications issued during the war years and emanating from various countries bears eloquent testimony to the prevalence of this disorder, the disability it engenders, and its refractoriness to treatment.

Excluding the use of crepe bandages and elastic stockings, popular interest has for long favored the intravenous injection of sclerosing agents as the treatment par excellence of varicosities, operation with sclerosing fluid as an adjunct being only slightly less privileged.

The operation [1, 2] about to be described is a natural development of my increasing aversion to sclerosing agents. Since it is executed under local anesthesia, the elderly, in whom varicosities are numerous and pronounced and of which dermatitis and ulceration are common features, are not debarred from its benefits. It entails the following:

1. The high-resection operation.

2. Division, between fine silk ligatures, of the great saphenous, its multiples and large tributaries, at intervals of 1 inch (in the thigh) or even ¾ inch (in the calf), from the midthigh to the region of the ankle. No sclerosant of any sort is used.

3. Disconnection of the small saphenous from the popliteal vein, and subdivision of the former as in the great saphenous.

The operation lasts from 1½ to 4½ hours in each leg, depending upon the size, number and accessibility of the veins (presence or absence of obesity), and whether the vessels are intimately adherent to the overlying skin as a result of mild but persistent chronic cellulitis, consequent upon many years of venous stagnation and low grade bacterial infection. In 500 limbs, from 15 to 55 incisions were employed. Incisions in the thigh vary from ⅓ inch to 1 inch, depending upon the thickness of subcutaneous fat overlying the vein; in the calf they vary from ⅛ inch to ¼ inch in length. They are placed transversely across the vein. Despite the long duration of the operative procedure, all patients could walk in the immediate postoperative period. In the past, an interval of two days was permitted to elapse between operations on both legs. Recently, however, the interval was extended to several weeks or months in the case of large varicosities, so as to facilitate convalescence and prevent pulmonary embolism. Recognition is herewith given Hanschell [3] who independently created the same operative procedure.

Among the indications for the operation may be the following:

1. Recurrence of varicosity after popular operations.

2. The ever-present fear that deep phlebitis and pulmonary embolism would follow the use of sclerosing agents.

3. The lingering pain after instillation of such agents.

4. The hope that convalescence would be promoted and shortened since postoperative inflammatory phenomena would be minimal in the absence of sclerosing therapy.

OPERATIVE AIDS

The following principles were found to be of value:

1. Careful preparation of the skin of both limbs (not only the limb scheduled for operation) from umbilicus to toes.

2. The surface marking of the great and small saphenous veins.[1]

3. Two assistants and four retractors.

4. The use of procaine 0.5 per cent solution without adrenalin as a local anesthetic. Of this solution, 80 to 120 cc. are employed in the groin, and 5 to 10 cc. at each of the distal sites of division, depending upon the amount

of subcutaneous fat present. Eighteen ounces of this solution were employed in one particular case without signs of toxicity.

5. Fine silk (00) as ligature material for the great saphenous or its tributaries.

6. The Trendelenburg position during operation so as to facilitate venous return, obviate stasis and effect marked diminution in the size of gross varicosities (from contraction of muscle fibers in the venous wall) so that these can be approached through tiny incisions.

7. Encouraging the patient to move his toes and ankles every 15 minutes during the operation. Venous return is thereby accelerated.

8. The introduction of liberal amounts of sterile sulfonamide crystals into each little wound made through skin the subject of chronic dermatitis.

POSTOPERATIVE MANAGEMENT

A small neat mercurochrome dressing is applied to the groin and kept in position by a figure-of-eight of elastoplast, while the remainder of the limb is swathed in a mercurochrome dressing, maintained by a large crepe bandage firmly applied. The patient walks on return to the ward, and thereafter for five minutes in each hour until 8:30 p.m. that night. Walking is repeated the following day, for five minutes each hour. Thereafter bed rest is encouraged. From the moment the patient is returned to the ward, regular movements of toes, ankles and knees are enjoined to be executed through the day, especially during the period of bed rest. In patients exhibiting chronic dermatitis or ulcer formation, 30,000 units of penicillin are injected intramuscularly every three hours until 10 doses have been given. Sutures are removed on the eighth to the tenth day. Bandages are worn for two weeks to a month after operation in order to encourage dispersal of edema.

RESULTS

In the three years ending February, 1947, 500 operations were performed.

Mortality. One death occurred in a healthy male of 42 years, from an interim complication, paralytic ileus of abstruse origin. Abdominal exploration revealed nothing abnormal. Despite intestinal suction, intravenous fluids and injections of penicillin, exitus occurred. Two patients with similar illnesses were encountered within a short period, one with and the other without varicosities.

Recovery. Convalescence was short. Most patients remained in the nursing home for only one day; some for two or three days; several (ulcer cases) for four days.

Postoperative pain was negligible in comparison with that experienced after sclerosing therapy.

Complications. Pulmonary embolism developed as a complication in one patient who had been subjected to two leg operations within three days. Embolism followed phlebothrombosis initiated by two factors: (1) the nonuse of the Trendelenburg position during operation; (2) the excess of coagulant substances liberated into the blood stream from the sites of operation.

Recovery followed bilateral femoral vein ligation. Dual limbs were thereafter subjected to operation at more protracted intervals.

Recurrence was manifest in four patients; in one, a varicose channel above midthigh made its appearance two years after operation (originating in the uncommon perforator described by Sherman); in another patient, a large tributary entering the saphenous immediately proximal to the knee was involved, while in a third patient a tributary below the knee showed itself. In the fourth patient the saphenous below the knee recanalized, but was satisfactorily obliterated by divisions at 1-inch intervals. In these four patients recurrence is attributed to segments of 2 inches to 2½ inches being constructed instead of shorter segments. In two other patients, accessory perforators (totally unrelated to the great saphenous and previously competent) became varicose and manifest. All these tributaries were satisfactorily dealt with by subdivision into silk-tied segments. Recurrences developed behind the knee in three patients with small saphenous varicosity, the complication undoubtedly resulting from inaccurate disconnection of small saphenous from the popliteal vein, so that a short stump of saphenous, instead of no stump, remained.

Observations. Most ulcers were healed by the tenth day, some after a further week

(especially when ulcer craters were filled with sterile sulfonamide crystals at the time of operation), and one after a month. In no case was ulcer excision or skin grafting employed, yet no ulcer failed to heal. All remained healed. Only in one case did subcutaneous abscesses occur. This was a patient with previous chronic dermatitis, in whom neither instillation of sterile crystals nor penicillin was used.

Limbs the seat of extensive chronic dermatitis, when observed after a period of two years, presented the appearance of healthy elastic skin.

Edema and swelling disappeared completely in all cases by the time a month had elapsed, exceptions being cases of very extensive dermatitis which required a further month. One case of phlebothrombosis with nonfatal pulmonary embolism occurred in a patient subjected to bilateral ligature of the femoral vein and required eight months. Even where extensive chronic dermatitis existed before operation, the limb subsequently was restored to its pristine shape. Fat legs became slim.

Some patients were at work within 24 hours after operation, some after a week, others after a month.

The scars of the smaller incisions are not discernible after three weeks. Male patients have never remarked upon the matter. Women in the fourth, fifth and sixth decades (the bulk of sufferers from varicose veins) have been too pleased to be rid of their pestilence to comment, even when 1-inch incisions became necessary to deal with very large and adherent veins or leashes of vessels. Even young women (possessed of otherwise shapely lower limbs) have expressed their pleasure at the disappearance of their tormenting varices, and have been content with the moderate length of their scars, for seldom are incisions exceeding ¼ inch in length necessary below the knee in such patients.

COMMENT

It is my belief, and experience lends substantiation to that belief, that when the great saphenous is subdivided into segments ¾ inch to 1 inch long, and tied at both ends by fine silk, the influence of all perforators, actual or potential (channels concatenating the great and small saphenous to the deep veins), becomes nullified as the T-shaped fragments rapidly thrombose and cicatrize. Not only is the operation effective in the thigh, but it is preeminently suited for obliteration of the numerous perforators in the calf. Several patients beyond the age of 70 were subjected to 4-hour operations, yet made smooth and easy recoveries. All were astounded at the moderate postoperative pain, and the early relief from ulcer distress.

The attention bestowed upon the great and small saphenous veins should likewise be conscientiously devoted to isolated varicose perforators (gluteal, calf and popliteal) and to the accessory varicose perforators of Sherman[4] (vessels draining the skin and passing directly to the femoral vein, but avoiding the great saphenous).

Certain authors[5] believe that no one method should be employed in the cure of varicosity. They utilize venous competency tests to correlate operative measures with the degree of varicose transformation in veins. The present writer disapproves of this policy, for the varicose change is a progressive one, especially in young and middle-aged patients, and since there is available a tried and proved remedy that can be utilized with local anesthesia, the writer contends that it should be employed in as many cases as possible, more especially since there is an increasing volume of opinion[4, 6, 7, 8] that clinical tests for venous competency are not regularly effective in the grading of varicosities.

SUMMARY

Most of the present-day methods employed in the treatment of varicosity are considered to be undesirable, since their efficacy is dependent upon the use of sclerosing agents. Apart from the facility of execution, sclerosing injections have nothing to recommend them, for not only do they fail to cure, but they expose the patient to loss of life or limb, prolonged morbidity or expense. Similar penalties beset operation coupled with the use of sclerosing substances. Recurrence is only too frequent a sequel of such injections or operations. In the multiple-resection operation a surgical procedure is envisioned which

is not difficult of accomplishment by the trained surgeon, is free of hazards associated with selerosing agents, and which, above all, extends the promise of permanent cure in young or old, without the added burden of pain or prolonged disablement.

SOMMAIRE

Quand la grande viene saphène est divisée en segments de ¾ a ¼ de pouce et ligaturée à chaque bout par une soie fine, l'influence de tous les perforations actuelles ou potentielles est annules, les segments se thrombosent et se cicatrisent.

Non seulement l'opération est efficace dans les cas intéressants la cuisse mais aussi donne des résultats très satisfaisants pour l'obliteration de nombreux perforateurs dans la jambe. De nos jours il y a facilité d'exécution. Les injections sclérosantes n'ont rien qui les commandent non seulement vue qu'elles ne guérissent pas mais aussi parce qu'elles exposent le malade à la perte de vie, mais ou bien à la perte des membres ou a une morbidité prolongée, et à des dépenses.

Les mêmes désavantages accompagnent les opérations associées à l'emploi de substances sclérosantes. Les récidives ne sont que trop fréquentes après telle injection et telle opération. Dans l'opération, les difficultés ne sont pas grandes, nous ne recontrons pas les hazards qui accompagnent l'emploi d'agents sclerosants, elle nous permet d'envisager une cure pour les jeunes ou pour les vieux, sans leur ajouter l'inconvénient de la douleur ou de l'invalidisme.

RIASSUNTO

Allorquando la vena safena magna viene suddivisa in sezioni (lunghe da 2 a 2½ centimetri) legate alle estremita' do fili di seta, l'influenza delle vene perforanti diventa nulla, in quanto le sezioni della vena si trombizzano rapidamente. L'operazione offre risultati eccellenti non solo a livello della coscio, ma e' specialmente adatta per l'obliterazione delle numerose vene perforanti del polpaccio.

La massima parte degli altri metodi per il trattamento delle vene varicose offrono il fianco alla critica, perche' dipendono dall'uso di sostanze selerosanti. Queste falliscono non solo al loro scopo, ma espongono i pazienti ad una lunga morbilita', a grandi spese, alla perdita eventuale delle gambe a talvolta della vita.

La resezione multipla delle vene—che non e' difficile per un chirurgo bene allenato—e' invece priva di pericoli, mentre offre tanto ai giovani, quanto ai vecçhi la promessa di una cura definitiva.

SUMARIO

La division de la vena safena interna an segmentos de 2 a 2½ cms. de largo y la ligadura con seda fina de los extremidades de estos segmentos produce su cicatrización completa y por lo tanto la eliminación de las ramas colaterales que son en general la causa de las recidivas.

La mayoria de los metodos de tratamiento de las varicosidades de la pierna no son satisfactorios por cuanto dependen del uso de substancias esclerosantes vue producen frecuentes recidivas. En cambio el metodo sugerido re resección multiple con segmentación de la safena interna y de sus colaterales cuando se practica con cuidado da exelentes resultados y esta libre delos peligros que acompanan el uso de los agentes esclerosantes.

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Results with Medullary Nailing of Fractures of the Femur*

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MEDULLARY nailing, first described by Küntscher in 1939, has given the impetus to a sweeping change in the treatment of fractures. The operation proved to be such a daring one that for a time it amazed most contemporary surgeons, including myself. In some quarters the reaction was one of sharp opposition. Küntscher's idea originated from the nailing of the neck of the femur. The operation became quite commonplace, and so far has been employed in 184 cases in our clinic with complete success.

The basic idea is to drive a long metal nail into the medullary space of the fractured bone. The nail should be long and thick, but slightly less in size than the medullary space itself. The purpose of the nail is to serve as an inside splint, so that the ends of the fragment can be perfectly approximated and assured against displacement. The nail itself is made of noncorrosive V_2A steel, double-plated, V-shaped in cross section.

In the first description of the operation the approximation of the fractured ends is carried out under x-ray control. As soon as this is completed, a hole is bored in the medullary space, following an incision, at a spot at a distance from the fracture, preferably just below the trochanter major, if the femur is broken, or beside the tuberositas tibiae, if the fracture is on the tibia. Through the hole a thin metal wire 200 to 300 mm. long, is slid into the medullary space, and then the steel nail itself is driven along this guide wire. The nail is thrust into the medullary space of the distal fragment to a depth of not more more than 60 to 80 mm. The nail should be removed after 3 months.

Today the technic is quite different. At first glance it seems to be a barbaric technic that defies the laws of biology. Theoretically, a foreign body driven into the medullary space should prove a risky and dangerous procedure. But theory has again been disproved by practice.

Pathologically, the following points must be considered:

1. The effect caused and the part played by a foreign body in a closed medullary space, from the standpoint of sequestration, and the development of callus.
2. Fat embolism as a result of medullary destruction.
3. Effect of the operation on the marrow as a blood forming organ.
4. Possibility and consequences of an infection.

Judging from cases on record, no sequestration, and no fistulae will be developed if there was no infection. Undisturbed and smooth development of callus has been proved by animal experiments, and by surgical results in 82 cases. X-ray control films demonstrate that ossification of the ends of the fragments is perfect.

Concerning the danger of fat embolism, in our opinion, the fracture itself, by its violence, causes worse medullary destruction than does this method of nailing. None of the 82 patients in our practice died of fat embolism.

The effect of the operation on the marrow as a blood generating organ, was of particular interest both from the pathologic and clinical point of view. As an approach to the problem we studied the qualitative and quantitative blood count of patients undergoing the medullary nailing operation. Blood counts were made once prior to the operation, and then every five to six days following it, and finally some time between three and six months after the operation. Summing up the results of these counts, we found that the red blood cells increased up to between 10 and 30 per cent following the nailing operation, with a corresponding rise in hemo-

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globin. In every case there was a striking reaction on the part of the thrombocytes and the reticulocytes, both increasing up to 50 per cent in many of the cases. There was hardly any noticeable change in the leukocyte count. The qualitative blood count showed juvenile forms, with a lively increase of the eosinophile cells, in some cases comprising as much as 8 to 10 per cent. There is some ground for the assumption, therefore, that medullary nailing is apt to stimulate the blood generating activity of the marrow.

Complications. The most serious complication is an eventual infection. Suppuration occurred in 4 of our 82 cases, or 6 per cent. One case was fatal. All these cases with suppuration were old compound fractures with osteomyelitis and malunion, or cases healed with a false joint. These suppurating cases defied our precaution of waiting six to twelve months before carrying out the nailing operation on account of a latent infection. The 4 cases occurred at a time when prophylactic penicillin treatment was not yet available. Since we now administer penicillin prophylactically, and also use penicillin after the operation, no further cases of suppuration have occurred. It may be expected that with prophylactic penicillin treatment latent infections can be prevented from flaring up.

Indications. In 1943 we abandoned Küntscher's method of "closed nailing" as described above, replacing it by an open procedure. Open nailing has been adopted since old fractures, such as badly consolidated fractures and pseudoarthrosis, always had to be laid open. It was applied to new fractures calling for a nailing operation, since the nailing itself is a great deal less difficult to carry out technically once the fracture line is laid open. In recent years we decided to restrict the indication for medullary nailing because the operation seemed to have been used much too frequently in our country as well as abroad, to justify every consideration. Now it is no longer used if a fracture of the upper extremity is to be dealt with, in which case we prefer to resort to graft or wire suture, by preference combining the two methods. Medullary nailing, as a rule, will be used very seldom in the case of a fresh fracture of the tibia. A badly consolidated fracture of the tibia, or one healed with a false joint is, however, considered to offer a great deal more chance for the successful use of the nailing operation.

Indications for medullary nailing are: (1) the badly consolidated fractures of the femur; (2) those healed with a false joint; and (3) such new fractures of the femur which cannot be successfully dealt with by conservative means; and (4) where open reduction with internal fixation is indicated. Cases falling within these categories can be more successfully treated by medullary nailing than by the use of grafts, or the Lane-Lambotte method, or any other form of metal splint or wire stitching.

Technic. As a rule we use spinal (lumbar) anesthesia for medullary nailing of the femur. The patient is placed upon his sound side. Starting with the incision we expose the fracture site. If badly consolidated fractures must be dealt with, the fracture ends must be cut apart, sawing off as much of each as appears to be required to permit proper approximation. Any false joint must be properly excised. As soon as this is done the guide wire is slid into the medullary space of the proximal end, forcing it through the bone distal to the greater trochanter. The wire should reappear on a corresponding site on the skin. The nail, selected as to appropriate length and breadth, is then slid along the guide wire until it penetrates the distal fragment up to 60 to 80 mm. As a rule the nail itself is removed after one year.

We seldom use plaster cast around the pelvis to fix the fracture following the operation, preferring instead a plain plaster splint. The immobilizing splint is removed after four weeks and the patient is permitted to start walking immediately with crutches or specially designed canes.

SUMMARY

Medullary nailing contributed a great deal to the improvement of fracture treatment. It has been established, however, that medullary nailing can seriously affect the organism and therefore should never be resorted to unless a careful examination indicates that it is indicated. In our opinion this operation should be confined mainly to cases of fractures of

the femur, an exception being certain fractures of the tibia, in which it has proved to be an excellent and indispensable method.

SOMMAIRE

L'emploi de clous intéressant la moelle osseuse a contribué à améliorer le traitement des fractures. Il a été établi néamoins que cette méthode peut affecter l'organisme très sérieusement, et ne doit être employée qu'après un examen très approfondi. Dans notre opinion cette opération ne devrait être confinée aux cas de fracture du fémur et dans les exceptions très rares de fracture du tibia où elle est souvent une méthode excellente.

RIASSUNTO

La transfissione midollare delle ossa ha indubbiamente contribuito a migliorare i risultati delle fratture. Poiche' questo procedimento puo' coinvolgere delle gravi conseguenze per l'organismo, e' bene limitarlo ai casi in cui un esame accurato dimostra che e' utile, se non indispensabile. L'A. ritiene che vada limitato alle fratture del femore ed a talune fratture della tibia, nelle quali ha condotto a risultati eccellenti.

SUMARIO

El tratamiento de ciertas fracturas por la aguja intramedular es una contribución de mayor importancia. Sin embargo por los peligros que acarrea este tratamiento solo se debe de usar cuando hayan verdaderas indicaciones. En nuestra opinion esta operación esta indicado solamente en las fracturas del femur y en ciertas fracturas de la tibia, en las cuales ha probado ser un metodo excelente.

Intravenous Solutions: Facts and Fancies

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MUCH has been written concerning post-infusion reactions since our early pioneer work in 1930, in which we corroborated the earlier but well hidden articles of Florence Seibert and further established ways and means of eliminating these reactions. Seibert's work, published in the *American Journal of Physiology*, had not attracted attention, and when we began our work we started from an entirely different method of attack.

Despite all that has appeared in the literature since that time, many false ideas still exist in the mind of clinicians, and since reactions still appear, even in the best clinics and hospitals, many of the facts originally proved have been set aside or forgotten, and many new, fallacious ideas have been propounded and old theories revived. It is with this thought in mind that this paper is presented to review the facts concerning the use of intravenous solutions, to explain the occasional reactions that take place today, and to offer methods to eliminate even these.

In 1930 we published a report covering our investigation as to the cause of reactions. In this report we discussed hydrogen ion concentration and our finding that reactive solutions had a pH of 8 or over. We showed further that by adding small quantities of ammonia or acetic acid we could vary the hydrogen ion concentration of the solution but not change the reactive property. Thus a solution with pH of 8, which produces a reaction, could be adjusted to a pH of 6 yet still produce the reaction; conversely, a non-reactive solution with a pH of 6 could be adjusted to a pH of 8 yet not cause a reaction.

Thus we came to the conclusion that some alkaline compound was the cause of reactions. By careful chemical methods this was shown to be a nitrogen-containing organic compound. At this stage of our investigation we discovered Seibert's articles and carefully corroborated her work.

Seibert showed by animal experimentation that the compounds we had discovered were the product of bacterial growth in distilled water standing in laboratories for long periods of time. She named these compounds "pyrogens" and the organisms "pyrogenic bacteria." She identified these bacteria as bacilli belonging to Jordan's Group X1. Usually these bacteria are found in river water. Our own investigation disclosed them in varying numbers in tap water in numerous cities. Their number vary with the seasons, being most numerous during the summer since their optimum growth temperature is from 78° to 82° F.

Since this work of Seibert other bacteria have been shown capable of producing pyrogens. Thus Co Tui has demonstrated a number of varieties of both pathogenic and nonpathogenic organisms to be capable of producing pyrogens. None, however, seems so powerful along this line as those originally named by Seibert and now included in a family Bacteriaceae of the genus Achromobacter.

Banks in 1934 reported that *Pseudomonas ureae* and *scissa* were pyrogenic. Co Tui stressed the importance of the fact that *Proteus* vulgaris and *Bacillus subtilis* are pyrogen producers, since these organisms are *frequent air contaminants*. Such contaminants suggest a source of pyrogen-producing organisms other than tap water. Yet in all the studies made by Seibert, these organisms did not appear in distilled water which had been allowed to stand. The problem of growth of organisms in solutions and distilled water is different from the problem of growing organisms on agar or other media and then testing those organisms for pyrogenic reaction, as was done by Co Tui. It is quite probable that the above named air contaminants will not grow in distilled water. At least, in our ex-

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perience they have not been a factor in pyrogen production in solutions and the original organisms described by Seibert have been the organisms concerned.

It is their products, not the bacteria themselves, that cause reactions. Seibert filtered out bacteria from solutions by Berkefeld filters and showed that the solutions still produced temperature reactions. She did not establish the rate of growth but personal observations during the past few years have demonstrated that pyrogen can be developed within two hours at room temperature.

As a result of these investigations we came to the definite conclusion that ordinary tap water is the cause and source of contaminants for solutions, glassware, tubing, etc. More recent work has shown that films of moisture, as seen after washing glassware or rinsing rubber tubing can easily develop pyrogens sufficient to produce reactions; indeed a sufficient amount of pyrogen can be formed within an intravenous needle rinsed in tap water to produce a reaction.

One other characteristic of pyrogen which has received little attention is its extreme solubility. Thus pyrogen dried in a film on glassware or tubing is readily dissolved and removed by any aqueous solution in momentary contact with it. This accounts for the ease of reaction reduction when even small amounts of pyrogen-free solutions are run through contaminated tubing or needles. This property, however, also gives us an added safeguard. If 50 to 100 cc. of pyrogen-free solution are run through the intravenous set and needle and wasted, before the needle is inserted into the vein, one can almost completely eliminate danger from contaminated tubing and needles.

With this review of earlier work done, we shall now review each of the possible sources of reactions as we find them today.

SOLUTIONS

The suggested methods of our earlier work, distillation with baffle plates and deconcentrator tubes, or triple distillation to prevent pyrogen being carried over in spray, has been widely applied by hospitals and commercial manufacturers. Our warnings as to the cleansing of glassware and immediate sterilization have also been followed closely. In fact, before the war this was so strictly carried out that most commercial houses used only new glassware. During the war with its attendant shortage of glass a method of cleansing and sterilizing immediately with live steam was introduced which carries out our theory equally well, and has proved eminently satisfactory.

Our crude method of pyrogen analysis by permanganate which often proved in error, has been replaced by the more accurate, biologic assay method of injecting samples into rabbit veins and checking any rise in temperature or leukocyte count. This assay and the above methods have made all commercial solutions pyrogen-free except for one possibility. When each day's distillations is begun I have advised that the first fraction of distillate be discarded. If this is not done there is a possibility that the first pint or quart distilled may be contaminated by overnight accumulation of pyrogen in the apparatus itself. Since only certain samples of each lot are biologically assayed this contaminated quantity may be missed. Most manufacturers, however, either use the apparatus continually or follow this advice. This may explain the occasional reaction for which no other explanation is possible.

Thus we can say that commercial preparations in general are completely pyrogen-free. The same is not true of solutions made in hospitals. Many old-fashioned distilling apparatuses are still to be found in laboratories or supply rooms to which the manufacture of solutions is entrusted. The only idea we can express here is the wonder that infusions are not attended by more pyrogenic reactions under these circumstances.

Other technics for preparing pyrogen-free solutions have been advanced during the past 10 years. The adsorptive technic of Co Tui and his co-workers is the chief among these. Co Tui, using an adsorptive filter of asbestos, successfully prepared pyrogen-free solutions. The method is slow, and not very adaptable to large scale production, so that it has not found widespread use. Occasionally an article appears in which prolonged boiling with retort

for more than two hours is recommended to destroy pyrogens, although simple autoclaving will not, yet this method is never as sure as proper distillation and is cumbersome for large scale use. The very small hospital may find it advantageous, yet the economical price of available commercial preparations precludes the use of this method.

Thus proper preparation into pyrogen-free glassware and immediate sterilization still are the criteria in the production of pyrogen-free solutions.

One other important point which we stressed in our earlier work which has been carefully followed by commercial houses but is often a source of grief to hospitals, is the interval cleansing of distilling apparatus. Where the biologic assay method is used the necessity for cleansing the apparatus is readily detected; when not used, as in hospitals preparing their own solutions, the first warning may be a number of reactions. Cleansing at regular intervals depending on the amount of use, type of apparatus and degree of contamination, would prevent these reactions where it is inconvenient or impossible to do biologic assays.

CHEMICALS

Co Tui has called attention to the fact that the chemicals, glucose, sodium chloride, etc., used in the manufacture of intravenous solutions may not be free of pyrogens, regardless of their degree of ordinary chemical purity. It is conceivable that such contamination may exist, since these chemicals are dissolved, then evaporated. If it does exist, then only the method of Co Tui can successfully eradicate all pyrogens from solutions. However, in thousands of liters of solutions manufactured from C. P. glucose and salt at the University of Pennsylvania we never had a reaction traceable to these chemicals. Nor has this been found to be a factor in the commercial manufacture of solutions, so that we have come to the conclusion that good chemically pure drugs are free of pyrogens. Special manufacture of the chemicals with pyrogen-free distilled water may be a solution to this problem, but actually noncontamination should be the answer. Co Tui has shown that in the manufacture of sera, this factor can be an important one, and should be so regarded, using pyrogen-free distilled water in all stages of manufacture.

TUBING

We attempted (1930) to explode the myth that rubber tubing could be the source of reactions by careful and painstaking investigation. This myth has again returned to the extent that many types of rubber tubing are offered for intravenous use, each manufacturer claiming his to be reaction proof. Our work proved that rubber tubing, per se, no matter what type or make, could not produce reactions. We have, however, already called attention to the frequent contamination of rubber tubing with tap water. Enough pyrogen can be produced to cause reaction, no matter what type or make of tubing is used. Thus, rinsing out tubing, allowing it to lie, even to dry, before sterilization, has caused many a reaction blamed upon rubber tubing itself. With the shortage of trained hospital help, intravenous sets are often done up and prepared in a haphazard manner. Tubing is often rinsed in tap water, allowed to dry, then placed in sets and autoclaved at the convenience of nurse or technician.

When one considers that an intravenous needle containing tap water film can grow enough pyrogen in two hours to produce a reaction, one can easily see that the above preparation of tubing may cause many and severe reactions. Many hospitals will claim that this is not true, but one must remember that the concentration of pyrogen depends on water source, and also varies with seasons of the year.

Because of the meticulous care necessary to prevent reactions from contaminated tubing many suggestions as to care of rubber tubing have arisen, the chief one being that of boiling tubing in alkalized water. This comes from the old idea that tubing itself in some mysterious way is producer of reactions. It is true that prolonged boiling of tubing, as of solutions, will destroy pyrogen (the alkali is is no value), but here again we have weakened tubing, wet and unsuitable for placing in the usual I.V. set which usually is autoclaved. It is, however, much superior to the tubing

cleaned in a haphazard way and allowed to dry since it is also sterile and will not produce pyrogens.

Far better than this method, however, is the cellophane disposable tubing now supplied by several commercial manufacturers of solutions. This tubing is never in contact with tap water and thus is not contaminated by pyrogens. It is disposed of as soon as used, creating no problem in cleaning, and its cost is so low that it is actually cheaper than rubber tubing and the trained time necessary to keep rubber tubing pyrogen-free. Its widespread use during the war has proved its acceptability. Disposable rubber tubing is available also but here the manufacturer has often ignored the above concepts and furnished tubing already contaminated by rinsing with tap water and delayed sterilization. Some makes of this tubing are excellent, as witness many plasma sets, providing the tubing is discarded when used once only.

In blood transfusion technic, however, we are not so fortunate. Many antiquated sets are still in use and here improper cleansing, allowing pyrogens to be manufactured by not quickly sterilizing the sets, allows "tubing" reactions, and use of pyrogen-contaminated glassware and needles further adds to the hazard. These frequent and severe reactions often rob the transfusion of all the good it can do and does detriment to the patient. Disposable tubing (cellophane, rubber) and filters are now being manufactured, but to date these have not been too successful since no method is provided to bring positive pressure behind the filter until the column of blood finally reaches the needle and causes sufficient siphonage to force the blood through the filter. Undoubtedly this will be corrected in the near future, thus making the blood transfusion sets equally disposable and pyrogen-free. At present, use of disposable tubing and filters or, if these are unavailable, *careful cleansing* followed by *rinsing two or three times* with *pyrogen-free distilled* water and *immediate* sterilization is still the best method of preparing rubber tubing. Use of pyrogen-free vacuum bottles for drawing blood is another improvement on older methods often using pyrogen-contaminated glassware.

NEEDLES

In some hospitals using pyrogen-free solutions and cellophane sets, reactions may still occur, often bewildering to personnel. Careful examination of needles will often show dirt, contamination, or blood within the haft of the needle. Even without this, needles often are cleansed and allowed to stand for some time before a batch is sterilized, be it boiled or autoclaved. Here, then, is another source of pyrogen for which one must be on guard.

SENSITIVITY

Observation during the past few years has led me to believe that a difference exists in sensitivity to pyrogen. Thus, one patient in a ward may have successive reactions while others have none, though the same technic and sets were used. This variance in sensitivity first became apparent in connection with another phase of work we were doing with pyrogen in 1931. At that time we were using pyrogen to produce foreign protein reactions in treatment of Buerger's disease and other vascular diseases of the extremities. We prepared our pyrogen by concentrating under vacuum large quantities of pyrogen-positive distilled water, then autoclaving it, and injecting it intravenously. Many patients reacted differently to varying doses, and occasionally a patient reacted violently with chills and fever for 24 hours, whereas another patient receiving the same dose had no reaction or only slight temperature elevation. When a sensitive patient is discovered, it is needless to say that greatest precautions must be taken, or fluids should be administered by other methods.

PYROGEN

We know that pyrogen is a proteinlike substance containing nitrogen (L.A.R., 30); that it is of alkaline reaction, the product of certain bacteria. Nevertheless, little else is known about it. Co Tui has demonstrated that while it passes through the Berkefeld filter it will not pass through a Seitz filter of 200 seconds but will pass through a similar 42 second filter. Thus he has concluded that the size of particle of pyrogen is somewhere between one micron and 50 millimicrons. No

further knowledge concerning the chemical nature of pyrogen has thus far been established. Its widespread occurrence, the ideal condition for growing in water systems and the fact that a reaction towards it takes place in the human and animal body have led me to speculate concerning it. It has been observed clinically that hypersensitive patients frequently are those suffering with advanced malignancy. This opens room for speculation on the possibilities of pyrogen as a carcinogenic factor. This I have not had the facilities to investigate. It is certain, however, that all human beings and animals ingest it in drinking water and the body must set up some sort of reaction to it or we would have no reaction when it is introduced intravenously. Seibert, in one of her original papers, went so far as to state that the foreign protein reaction to milk and other protein then being used was due entirely to pyrogen. Further study of these interesting phenomena may some day prove of real value.

SPEED SHOCK

Many articles have appeared in the recent literature concerning speed shock. So much heed has been paid these articles that I frequently see patients with arms outstretched or fastened to splints for a whole afternoon—even a whole day—to receive one injection of 1000 cc. of saline or glucose. Aside from the discomfort to the patient and the long nursing observation necessary, this slowness in itself may frequently defeat the very purpose for which the infusion is given. A patient suffering with acute achloremia will not be much benefited by an intravenous infusion at 20 to 40 drops per minute; he may lose more chloride through stomach drainage or vomiting than the infusion is putting into his vein. I do not deny that "speed shock" may occur, but my own observation is that it occurs only in those with poor cardiac reserve, or right heart embarrassment (pulmonary embolism, cardiac tamponade, etc.) if solutions are run in at a reasonable speed. In the thousands of infusions I have given or observed I have never seen an instance of "speed shock" if these complications are absent, even though as much as 1000 cc. of solution is given in the course of 15 minutes. In my opinion "speed shock" is being overemphasized greatly to the detriment of the use of intravenous therapy. I repeat again, however, that in the presence of poor cardiac reserve, or embarrassed right heart, solutions must be given slowly. In the presence of shock especially, intravenous therapy must be given quickly—started quickly and run in rapidly—to be of any value. The large amounts of plasma and blood given the seriously wounded during World War II provide ample witness to the truth of this necessity.

Strumia has called attention to at least one indication for the slow administration of blood. That is, that in case blood is mismatched or contains an rH incompatibility, if it is given slowly, untoward reactions of this type can be detected when only a small amount of blood has been administered and the transfusion can be discontinued. Moreover, he has shown that the severity of such a reaction is in direct proportion to the amount administered. He also calls attention to the fact that in mild contamination with pyrogen, that reaction may be prevented by slow administration. With pyrogen-free solutions and sets, however, speed of injection can make no difference except as regards speed shock as discussed above.

EDEMA, HYPOPROTEINEMIA, HYPERCHLOREMIA

When intravenous solutions were found safe, huge quantities of saline and glucose were often given to seriously ill patients with the idea of "diluting and flushing out toxins." The result was that 8000 to 12,000 cc. per 24 hours were administered. Moderate to severe edema of extremities, presacral regions, etc., and often pulmonary edema resulted. More recent investigations showed the danger of introducing such excessive quantities of fluid without control of electrolyte balance and proper blood protein. The use of the hematocrit, blood protein and blood chloride tests are now essential in the proper administration of large quantities of fluids and all these complications of edema, pulmonary edema, hypoproteinemia and hyperchloremia may now be avoided by proper choice of solutions as guided by these tests. The use of amino acid solutions

has recently been added as a means of controlling hypoproteinemia. While the solutions commercially prepared are probably free of pyrogen, a different type of reaction is frequently seen after administration of these solutions. This is more of a shock type of reaction, with hives, redness of skin, respiratory embarrassment, dropping blood pressure, even when solutions are given slowly. This reaction probably is a sensitivity reaction such as one sees with the intravenous administration of animal sera. Chills and pyrexia also may occur but the reasons discussed above—tubing, needles, etc, probably are the factors producing these reactions.

SUMMARY AND CONCLUSIONS

This paper reviews the actual facts concerning pyrogens and reactions to intravenous injections as far as known today, and suggests methods of eliminating the occasional reaction seen if all the principles enunciated in a previous paper are adhered to. Speed shock and the newer concepts of intravenous therapy are reviewed, with the author's ideas drawn from personal experience. The proper preparation of solutions, use of disposable cellophane tubing, proper care of needles are emphasized, together with a suggestion that whenever one is in doubt a safety factor lies in the waste of 100 cc. of solution by allowing it to run through the set and needle before beginning the injection proper.

SOMMAIRE

Cette communication passe en revue nos connaissances sur les pyrogènes et sur les réactions des injections intraveineuses et suggère des méthodes pour éliminer les réactions occasionelles rencontrées. Tous les principes énumerés dans notre communication précédente sont en revue. On discute les nouvelles conception de la thérapie intraveineuse et l'auteur fait des recommandations basées sur son expérience personelles. On étudie la préparation des solutions, l'emploi de tubes en cellophane disposables. On suggère que lorsqu'on est en doute il importe de passer 100 cc. de la solution dans l'ensemble de l'appareil de aiguille de passer avant de commencer l'injection.

RIASSUNTO

In questa rivista sintetica l'A. riassume tutti i dati concernenti le sostanze pirogene e le reazioni che insorgono dopo fleboclisi. Passa in rassegna i piu' moderni concetti riguardanti la terapia intravenosa. Discute la preparazione piu' appropriata delle soluzioni: l'uso di tubi "cellophane" da scartarsi di volta in volta: la preparazione piu' adatta degli aghi. Qualora esistano dei dubbi, la migliore misura precauzionale consiste nel fare defluire 100 cc. della soluzione attraverso bottiglie, tubi, aghi, prima di iniziare la fleboclisi.

SUMARIO

Se ha presentado un estudio de las reacciones pirogenicas y otras que resultan de las inyecciones intravenosas y se sugieren metodos preventivos. También se hace una revista de los conceptos modernos sobre la terapeutica intravenosa y del shock. Se recomienda gran cuidado en la preparación de las soluciones, asi como de los aparatos que son necesarios para la administración de preparaciones por via intravenosa, incluyendo el uso del tubo de celofano. También se sugiere se deje correr como cien centimetros cubicos de la solución antes de comenzar la inyección para asi lavar el tubo de celofano y la aguja de impuridades.

Twin Stitches: A New Technic*

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THE suture method described below constitutes a technic which facilitates the task of suturing tissues in situations presenting extraordinary difficulties, either because of tension or relative inaccessibility. Moreover, the method promotes the formation of a transverse band of tissue, which gives very useful support in certain operations.

The suture consists of two equal stitches, termed "twin stitches" because they are applied in identical manner and tied by means of two square knots.

TECHNIC

Two separate quarter-length sutures (A and B Fig. 1a) are applied in the same direction, either parallel to each other or in slightly convergent lines. Instead of following the usual procedure of tying both ends of the same thread, that is, A1 and A2, and B1 and B2, the basic idea of the twin stitches consists in fastening one end of A to the corresponging end of B. Thus, A1 is tied to B1, and A2 to B2 (Fig. 1b). For technical reasons, it is best to begin with the lower end of the threads, and to tie A2 and B2 before joining A1 and B1.

Since no resistance is encountered when A2 and B2 are united, one must avoid exerting traction on the threads while knotting the two ends, and one must be careful not to pull the threads out of the stitch canals. The ligature should be left long after the first square knot has been fastened, lest the knot be loosened while the other ends (A1 and B1) are being tied, a procedure which generally must be done under a certain amount of tension. In order to avoid loosening of the second knot (A1 and B1) while tying under tension, it is advisable to grasp and hold the first half of the square knot with the outermost point of a small hemostat until the second half of the square knot has been securely tied. This method has been found to be more satisfactory than that of the "surgical knot," for the latter does not prevent loosening either and, in addition, makes a rather large knot. There is little danger of damaging the thread by gentle application of a fine hemostat to the first half-hitch if care is taken that the knot is merely held in place, and not crushed, by the instrument.

The use of this suturing method will be illustrated in a number of vaginal operations, and it will be seen that the efficiency of the surgical procedure is enhanced by the twin stitches. This improvement, in turn, makes it possible to extend the scope of the given operation. Thus, in many a case, one can undertake simpler operative procedures which would be inadequate without the twin-stitch technic. On the other hand, a more radical intervention may be made possible because the technical problems involved are considerably simplified by the use of the twin stitches.

BIOPSY OF THE CERVIX

In a biopsy of the cervix, the usual procedure of removing only a small piece is not adequate. It is advisable to excise a larger wedge-shaped piece, in order to give the pathologist the opportunity to carry out his histologic investigations on a reasonably extensive scale. Employment of the twin-stitch technic will greatly facilitate matters in operations of this kind, notably in checking the bleeding which is naturally more copious when biopsy material of some size is removed.

Technic. Let us assume that the suspected part of the cervix is at 3 o'clock. The first of the twin stitches (A) is applied at 1 o'clock, the second (B) at 5 o'clock, but the ends are not tied (Fig. 2). A wedge-shaped piece of the cervix is excised between 2 and 4 o'clock. The ends of the applied ligatures in the inside of the cervical canal (A2 and B2) are now tied and left long. Thereupon the ends on the outside of the cervix (A1 and B1) are united in the same manner. The gap resulting from the excision is thus closed, and usually the bleeding is controlled by the first

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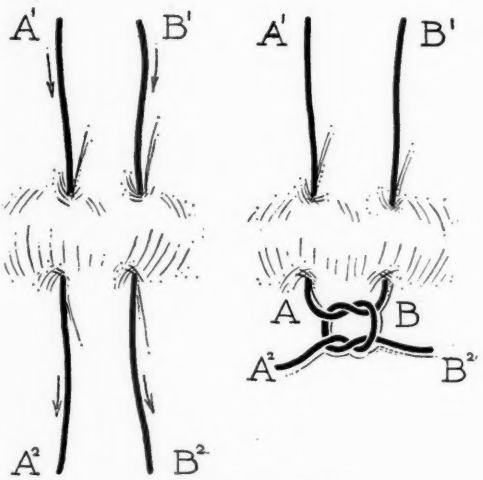

Fig. 1. Twin-stitch technic. Two separate quarter-length sutures A and B are applied in the same direction parallel to each other. A2 and B2 are tied first and then A1 and B1. A2 and B2 are tied first because the ligatures should be left long to avoid loosening of the knot while tying the opposite knot frequently under tension. If A1 and B1 are tied first the dropping ligature which has been left long would interfere with tying the lower knot A2 and B2.

set of twin stitches. Needless to say, a second and third set of twin stitches may be applied to close the remainder of the wound.

Since employment of the twin-stitch technic makes the operation (notably in the control of bleeding) so much simpler and easier, it should be the established rule that excisions from the cervix for diagnostic purposes should be wedge-shaped and of sufficient size. Biopsies should not be done in the office, for small pieces of tissue are of limited diagnostic value and indeed may lead the physician to overlook the cancer in its all-important, early phase.

AMPUTATION OF THE CERVIX

The twin-stitch technic has been found extremely useful in cervical amputations performed in accordance with Sturmdorff's idea of inverting the vaginal mucosa into the cervical canal. Application of the twin stitches is easy and there is little danger of making a technical error. Likewise there is less danger of having the needle break or the thread getting snarled. Besides, the twin stitches have the advantage of reinforcing by means of the first knot, the very point at which the suture is most likely to tear.

TECHNIC

One tenaculum forceps grasps the anterior, and one the posterior lip of the cervix. A circular incision is made around the cervix, saving as much vaginal mucosa as will be necessary for the subsequent inversion. The vaginal wall is pushed backward, and the sutures designed to control the bleeding are applied at the appropriate height on both sides of the cervix. The twin stitches are applied immediately, following conical amputation of the cervix. Every twin stitch must begin and end on an intact surface. The anterior set of twin stitches starts on the *intact* surface outside of the cervix, pierces the wall of the cervix, runs through the cervical canal, and then pierces the anterior flap of the vaginal mucosa near the edge of the incision, going in the direction from the wound area to the *intact* surface (Fig. 3). A and B are applied in the same manner, close together and parallel to each other. Thread ends A2 and B2 are tied by means of a square knot, and the excess ligature left long. Traction on A1 and B1 draws the vaginal flap into the interior of the cervical canal. Then ends A1 and B1 are tied in the manner described above, and all excess threads are cut off.

The posterior set of twin stitches is best applied by first piercing the vaginal flap from the *intact* surface to the wound area, and then running the suture from the interior side of the cervical canal to the *intact* exterior side of the cervix. A and B are applied in the same manner, close together and parallel to each other. The ends of the twin-stitches *on the vaginal flap* are first tied and left long. Traction on the other thread-ends serves to draw the vaginal flap into the interior of the cervical canal. The ends at the cervix are then tied, in the manner previously described, and all excess threads are cut off.

URINARY INCONTINENCE

Having obtained gratifying results with the twin stitches in 17 operations for urinary incontinence, I feel that this new technic may be recommended for operations for urinary incontinence. It would take us too far afield

to engage in a detailed discussion of the causes of incontinence and of the various operations that have been recommended to cope with this affliction.

It should be mentioned, however, that a dropped floor of the bladder neck is now generally regarded as an important factor in the etiology of urinary incontinence, and that the main objective of surgical intervention is to lend fascial support to the dropped neck of the bladder. Special stress is laid on the formation of a transverse fascial band, the purpose of which is to improve the action of the sphincter by raising the floor of the bladder. In the formation of this band one encounters the same difficulties as in other fascial sutures which must be fastened under tension. The strong fascia, which is to serve as support, is often accidentally severed by the thread. To prevent such an occurrence, U-shaped stitches or mattress sutures were made. It should be noted, however, that both of these procedures require the "back-hand technic" to apply the suture to the patient's right side. The needle must be placed in the needle-holder in the reverse position and the hand must grasp and guide the needle-holder as in making a back-hand stroke in tennis. Under these circumstances, it is difficult to operate with skill and precision. Use of the twin-stitch technic makes it easier to deal with this important phase of the operation. The formation of the transverse fascial band is more accurate and this makes for better results. The twin stitches virtually eliminate the danger of a break in this important suture, which must often be tied under considerable tension, because the first square knot strengthens just the point where the suture usually breaks. This obviates the necessity of any more stitching and any further weakening and damage to the fascia.

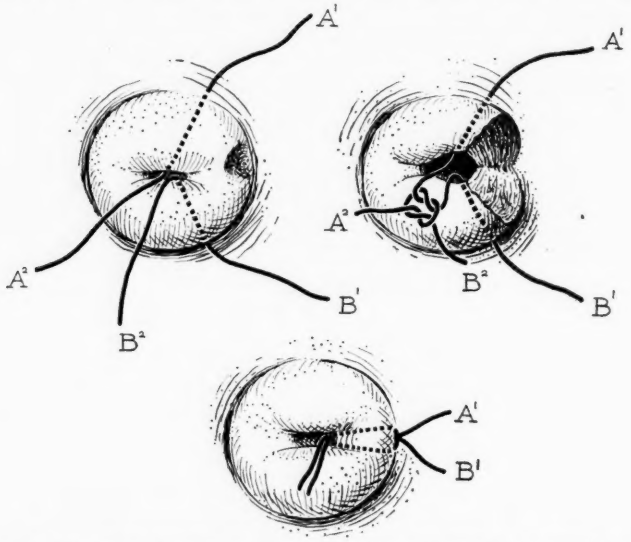

Fig. 2. Biopsy of the cervix. The twin stitches A and B are applied at 1 and 5 o'clock and a wedge-shaped excision of the suspicious area is performed. A2 and B2 in the inside of the cervical canal have to be united first. By the following tying of A1 and B1 the bleeding is controlled and the gap closed.

Technic. A midline incision is made through the anterior vaginal wall from about 1 cm. below the external urinary meatus toward the cervix. The knife cuts through the entire thickness of the vaginal mucosa, but not through the underlying vesicovaginal fascia. By working from the outside of the vagina toward the fascia, it is easy to find the line of cleavage between the vaginal mucosa and the septum. Following plication of the fascia,

should this be necessary in the case of a cystocele, the twin stitches are applied to the right and left of the neck of the bladder, in the sphincter region. It is unnecessary to mark this site by introducing a mushroom catheter, for the main objective of the operation is not to suture the sphincter, but rather to raise the neck of the bladder. When the twin stitches have been applied, the lower ends, that is, A2 and B2, are tied and left long. The knot should be a flat square knot. Now the upper ends, A1 and B1, are tied and, as described above, the first half of the square knot, which must be drawn under more or less tension, may be held in place with the outermost point of a fine hemostat until the second half has been completed. It is well to have each of the twin stitches take considerable bite of fascia which can readily be done with the aid of a fine, moderately curved needle. The principal aim of the twin stitches is to promote the formation of a sturdy, transverse band of tissue at the neck of the bladder, near the sphincter area (Fig. 4), since this approach has been found most effective in the management of urinary incontinence. Catgut, or preferably some nonresorbable material such as silk or linen may be used for suturing.[1, 2, 3, 4]

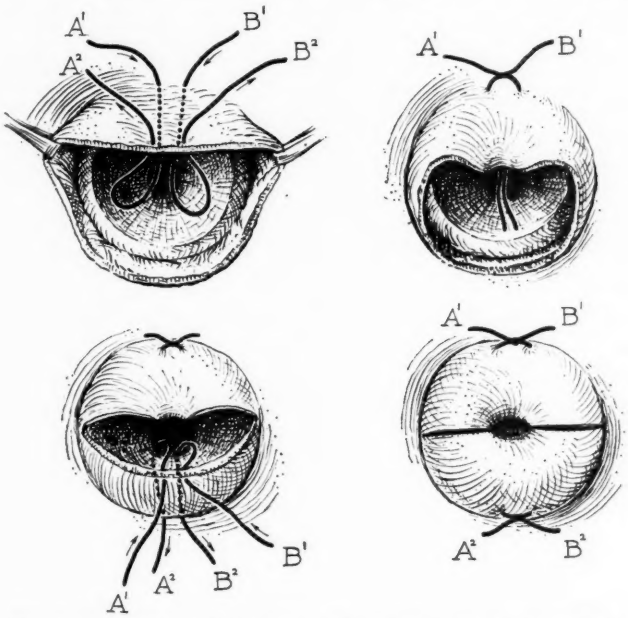

Fig. 3. Amputation of the cervix. The anterior set of twin stitches A and B starts on the *intact* outer surface of the cervix, runs through the cervical canal and ends on the *intact* surface of the vaginal flap. A2 and B2 are tied first. Traction on A1 and B1 pulls the vaginal flap into the cervical canal. Then A1 and B1 are united. The posterior set of twin stitches A and B starts at the *intact* outside of the vaginal flap, runs through the cervical canal and ends at the *intact* outside of the cervix. Here A1 and B1 are tied first in order to pull the vaginal flap into the cervical canal by traction on A2 and B2. Then A2 and B2 are united.

UTERINE PROLAPSE

The twin-stitch technic can be used to advantage also in suturing the broad ligaments in operations for uterine prolapse. The twin stitches make it possible to promote the formation of a double, transverse "bridge" of fascia in front of the cervix, without cutting through a part of the broad ligament, and without in-

volving the the cervix in the suturing process. The prime objective of uniting the broad ligaments with the aid of the twin-stitch technic is both to support and raise the cervix.

stitches is tied. The vaginal mucosa is closed, starting at the cervix and working in the direction to the urethral meatus. A colpoperineorrhaphy completes the procedure.

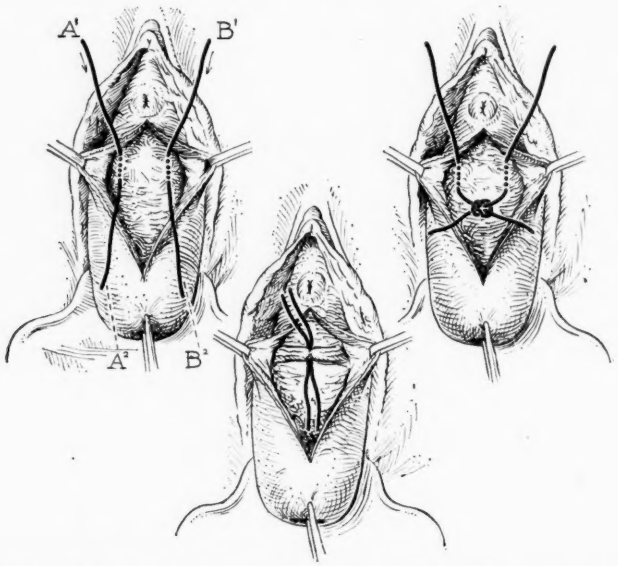

Fig. 4. Formation of a transverse band at the bladder neck against urinary incontinence. The twin stitches A and B are applied to the right and left of the bladder neck in the sphincter region. A2 and B2 are tied first and left long, then A1 and B1 are united.

and thus to create an axis about which the uterus can turn in the sagittal plane. The intraabdominal pressure is exerted against the posterior wall of the uterine body and causes the uterus to revolve on the newly formed fascial band, which serves as an axis.

Technic. A tenaculum forceps grasps the anterior lip of the cervix. An inverted T-incision is made through the entire thickness of the anterior vaginal mucosa, and the vaginal mucosa is separated from the fascia, which is left intact, on the bladder. The excess vaginal mucosa is resected, and the fascia are plicated over the cystocele. The twin stitches are applied to the tissue of the broad ligament on the right and left sides of the cervix and the lower square knot is tied. The tenaculum forceps is then removed from the cervix, and the cervix is pushed back before the second square knot of the twin

SUMMARY

This report presents a description of the twin-stitch techniic and its use in various vaginal operations.

The advantages of this new technic are: exact hemostasis; avoidance of tissue damage; avoidance of damage to suturing material when tying under tension; formation of bands of fascia, which serve as valuable points of support; simplification of the technic of difficult steps in certain vaginal operations.

The twin-stitch technic is briefly described in its application to the following operations: biopsy of the cervix, amputation of the cervix, operation for urinary incontinence, and operation for uterine prolapse.

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Subphrenic Abscess

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"Shakiness of the hand may be some bar to the successful performance of an operation, but he of a shaky mind is hopeless."—Sir Frederick Treves.

SUBPHRENIC abscess is rarer than in former days. There is little doubt that the general adoption of Fowler's position in cases of peritonitis is the principle reason for the decline in the incidence of this grave complication.

An important consideration, and one which is not generally appreciated, is that in a high percentage of cases subphrenic *infection* resolves; consequently many cases of this infection pass through our hands, perhaps suspected, but never concretely diagnosed; Alton Ochsner places the number of cases falling into this category as high as 70 per cent. It is only when suppuration occurs that failure to diagnose the condition spells disaster, for unless the abscess bursts into the bronchial tree, the patient is doomed. Sulfanilamide and penicillin therapy doubtless help to increase the number of cases of subphrenic *infections* which resolve. The exhibition of these drugs in cases of subphrenic *abscess* may, by masking the symptoms, counterbalance the good that can be expected by their administration in those cases which have not reached the stage of suppuration.

Examples of subphrenic suppuration are still sufficiently common to make it imperative for the surgeon to study the subject closely. At the outset he must face the fact that for many years subphrenic abscesses have been linked with a formidable mortality. If unreported cases, and those patients who die without drainage of the abscess, are taken into consideration, the death rate can be little short of 40 per cent. The chief obstacle to overcome is "too late"; the diagnosis, always difficult, so often becomes confused because of concomitant signs in the base of the lung.

Complicated nomenclature and the tendency of surgical and pure anatomists to utilize subdivisions of this space as an arena for testing a candidate's knowledge of anatomical relations have too often resulted in a feeling of dismay in those who need to refresh their memories quickly on the possible disposition of a collection of pus beneath the diaphragm. Most of these abscesses occur on the right side; the right posterior space is the one most frequently involved. A right anterior subphrenic abscess is often associated with a subhepatic abscess. To most surgeons, subphrenic abscess means right subphrenic abscess. Consequently, subphrenic abscesses on the left side, which should be expected once in every four or five cases (Carter), are missed or diagnosis delayed unduly even more often than with those on the right side. To keep the condition in mind is half the battle. Some subphrenic abscesses are not confined to a single space; Graham has encountered two cases where both the left and the right side needed drainage.

THE PRIMARY LESION

Nearly all subphrenic abscesses follow a known intraperitoneal lesion. Heading lists of mass statistics of reported cases is acute appendicitis, with perforated peptic ulcer following not far behind. Then comes a miscellaneous collection of inflammatory conditions, on the relative frequency of which it is unprofitable to linger. I subscribe to Raw's observation that in cases of subphrenic abscess following perforated duodenal ulcer, the subphrenic abscess is frequently an extension of a subhepatic abscess. This suggests that if Rutherford Morison's pouch were drained more often in late cases of perforated duodenal ulcers, and in perforations that are difficult to suture, we should be spared quite a number of subphrenic abscesses.

DIAGNOSIS

"Sign of pus somewhere, signs of pus nowhere else, signs of pus *there*" was Barnard's

aphorism, and it is a marvelous compendium of the clinical situation. One would have thought that, during the 40 years which have elapsed since Barnard framed this guide, advance in diagnostic adjuvants would have rendered the diagnosis more scientifically certain, and consequently less onerous. In order to explain my meaning; in Barnard's day, when a tuberculous kidney was removed, the operation had to be undertaken without preoperative proof of the exact location of the disease. Today, thanks to advances in radiology, cystoscopy and laboratory tests, we know beforehand precisely the location of the lesion and the integrity or lack of it of the contralateral organ. In the case of a tuberculous kidney, the clinician's responsibility for making the diagnosis is more than halved, it is quartered. I want to impress upon the reader that in cases of subphrenic abscess, the surgeon in charge of the case must take the whole responsibility for making the diagnosis, and be thankful for a modicum of help from outside sources. *He must not rely upon the laboratory.* To know that the patient has a high leucocyte count is of considerable assistance, but this is all the help that can be received from this source. *He must not rely on radiology.* Most of my patients have been too ill to be sent with safety to the roentgen department; even if they were permitted to be transported thither, they were definitely not well enough to stand in an erect posture for the screening, which is, I understand, the only satisfactory method of visualizing the diaphragm. Roentgenograms taken with portable apparatus are not often helpful; I have several times been misled by the report on such findings. However, in the case of left-sided abscess, it may prove the means of elucidating the diagnosis. After swallowing barium, the patient is examined in Trendelenburg's position. If there is a left-sided subphrenic abscess, the stomach will be seen displaced downwards. Even a plain film with the patient in Fowler's position may reveal a bubble of gas beneath the diaphragm. This bubble is to be regarded as a sign of great diagnostic significance, but it is only when three weeks have elapsed since laparotomy that the sign is a boon; before that time it is often a snare and a delusion. After any laparotomy, a bubble of gas (ari) can frequently be demonstrated radiologically. By the end of the third week such a bubble should have vanished. *He must not rely on a physician.* Far be it from me to create an impression that I wish to ridicule or belittle the opinions of the many physicians with whom I have worked; on the contrary, I am forever indebted to them in many ways. In this instance however, I think it is unwise for the surgeon to endeavor to shift his responsibility. It so often entails repetition of various tests, which eventually prove inconclusive, that in some instances the opportune time for the operation is lost.

Needling for a subphrenic abscess should be forbidden absolutely. It may be quite justifiable to pass a needle into the pleural cavity to ascertain whether fluid is present and the nature of that fluid, but to pass the needle onwards in the endeavor to locate pus beneath the diaphragm is the quintessence of impropriety. Under no circumstances, whoever advises it, should the surgeon weaken his resolve to refrain from attempting to confirm the diagnosis by this expedient, for if he does so and a subphrenic abscess is present, the pleural cavity will inevitably become seriously infected.

I wish it were possible to set out a list of visible signs upon which a diagnosis of subphrenic abscess could be formulated. No one has as yet succeeded in bringing forward even one sign that is proof positive. However, the following list of points may be helpful:

(a) When the primary lesion is situated in the right upper abdomen there is nearly always a purulent discharge from the wound;
(b) Watch patiently for Litten's diaphragmatic shadow;
(c) In cases of right posterior abscess, there is often tenderness over the eleventh interspace; to elicit this satisfactorily the patient must be turned on his face;
(d) In cases of *left*-sided subphrenic abscess, there is usually tenderness and sometimes swelling beneath the left costal margin;
(e) Just as in acute osteomyelitis there is a "sympathetic arthritis", so in subphrenic abscess there is concomitant basal pleurisy or pleuropneumonia.

It must therefore be clearly understood that a pleural effusion and/or some consolidation of the base of the lung on the corresponding side helps rather than hinders the diagnosis of subphrenic abscess.

DRAINAGE

I was brought up in Barnard's school. Actually that brilliant surgeon had died before I started my studies, but his teachings still prevailed; many of them have proved to be of permanent value. Regarding the treatment (as opposed to the diagnosis) of subphrenic abscess, this was not the case. I was taught to drain a subphrenic abscess by the transpleural route. The mortality following the procedure was depressing. As time went on, I effected a little improvement of my own practice by conducting the operation in two stages in order to promote adhesions between the layers of the pleura.

Although it is probable that there are still a few examples where the transpleural route is the method of choice, I completely revised my technic following the publication of Ochsner and Graves' paper. Before reading that, it had never occurred to me to drain the common right posterior subphrenic abscess extrapleurally through the bed of the resected twelfth rib. I also found that Ochsner and Graves' common sense method of draining an anteriorly placed abscess through an incision beneath the costal margin was a revelation of efficacy.

SUMMARY

Special emphasis has been placed on the diagnosis of this comparatively rare condition, because the usual diagnostic aids, such as laboratory and roentgen examinations, are not sufficient to establish the diagnosis. The surgeon must make himself thoroughly familiar with the entire picture of the condition and he must remember that such an expedient as needling for a subphrenic abscess is quite forbidden. The treatment, especially the technic of drainage, is discussed.

RÉSUMÉ

L'auteur décrit minutieusement cette condition relativement assez rare. Il étudie surtant les difficultés du diagnostic de cet état, et il notis dit que le laboratoire et les x-rayons ne suffisent pas pour établir positivement le diagnostic d'abcès sous-phrénique. Il est dangereux d'avoir recours à la ponction pour établie le diagnostic. Le traitement et surtout la technique du drainage sont étudiés et discutés.

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A Historical Review of the Appendix and Its Disease

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THOSE who are concerned with the management of appendicitis should not be unmindful of the story of its development. Surgery owes its progress to imagination which raises a surgeon above mediocrity. The first person who removed a crushed limb, the first man who used the branch of a tree as a splint for a broken bone, the first who tied a bleeding vessel and the first who recognized the value of antisepsis—these were the great pioneers in surgery who exhibited the gift of imagination.

It is difficult to believe that the appendix baffled scientific imagination for generations. The earliest account in existence of evacuation of pus from the right lower quadrant of the abdomen dates back to B.C. 50. A body found in Egypt belonging to the Byzantine period (A.D. 400) showed evidence of adhesions about an old inflammation of the appendix.

Anatomically, the appendix has been known since the sixteenth century; pathologically, it was recognized in the eighteenth century. Clinically, it is the product only of the nineteenth century, while surgical recognition was accorded it only in the latter part of that century. Most of the improved surgical work on diseases of the appendix and their complications has been done during the twentieth century.

Berengarius of Carpi identified the appendix in 1524, and it was described as an anatomic entity by Vesalius in 1543. Fallopius portrayed it in 1561, and Vidius gave it the name of vermiform appendix.

It was not until the middle of the eighteenth century, that any description of appendicular disease was found, and France claims the credit, for in 1759 Mestivier removed a pint of pus from the right iliac fossa. The patient died a few days later and at necropsy "a large rusty pin was found in the vermiform appendix." In the same period in France similar collections of pus were evacuated in three patients. In each case the suppuration had been caused by foreign bodies in the appendix.

The nineteenth century brought clinical descriptions of the disease. In 1824, Villarmy wrote, "the earliest symptom appearing in the form of colic is probably accounted for by the inflammation and distention of the appendix. Its rupture occasioned an effusion which was responsible in turn for peritonitis." In 1827 Mélier wrote that acute appendicitis was a clinical entity which might, under certain circumstances, become a rapidly fatal disease. France would have continued its advance but for the unfortunate bigotry of Dupuytren whose reputation had great influence in France at the time. He was of the firm opinion that the inflammatory processes originated in the cecum and refused to believe that the appendix could be the seat of the trouble and thus blocked the way to progress. He was a firm believer in typhlitis and perityphlitis.

During this same period, in 1842, Parkinson, in England, called attention to perforation of the appendix as the cause of death in one of his cases. Having read the French publications by Mélier, English physicians searched out their own records. Bright and Addison of Guy's Hospital, set out minute details of symptoms elicited, signs observed, and necropsy findings in appendicular disease. It is deplorable that the students of Guy's Hospital, though they made so much of the medical diseases described by Bright and Addison, ignored their writings on the appendix which are epochal observations on appendicitis.

In the year 1848, Hancock of Charing Cross Hospital successfully operated upon a diseased appendix before fluctuation occurred.

It now remained for the Americans to take hold of the knowledge thus far acquired in the old world and to breathe new life into it. Willard Parker of New York in 1850 published four case histories in which evacuation of pus from the right iliac fossa was successfully carried out. Reginald Fitz of Boston, a pathologist, coined and used the term "appendicitis" for the first time in 1886, as

opposed to typhlitis and perityphlitis. He wrote vigorously and persistently and called attention to the size, shape and position of the appendix and its bearing on clinical conditions. He emphasized the importance of early operative interference. As a pathologist, he found in his necropsy studies that in most of the fatal cases of so-called typhlitis, the cecum was intact, while the appendix was ulcerated and in some cases even perforated. From vast experience of postmortem findings, he maintained that the appendix was the cause of the trouble and not the cecum, and insisted that these cases which were sent to the postmortem room from under the care of physicians should be handled by surgeons. Thus by a pathologist's careful and intelligent study, lesions of the appendix have been taken over into the domain of surgery where they rightly belong and where they have stayed.

Perhaps the greatest early exponent of the operation to remove the appendix was Sir Frederick Treves in England who, it may be recalled, operated upon King Edward VII on the eve of his coronation. It was also Sir Frederick Treves who, for the first time, suggested removing the appendix during a quiescent period. The priority for doing the first successful operation goes to Charles Symonds of Guy's Hospital, who performed what he styled the "interval operation" on August 4, 1885. Arthur Hurst of Guy's Hospital says, "Charles Symonds performed the first interval operation not only in England but the whole world." In America, Morton, of Philadelphia, and Sands independently removed the appendix successfully in the year 1887. It is interesting to read an extract from the Lancet of June 4th, 1938. Samuel J. Smith from Southern Rhodesia writes, "It may interest you to know that it is now fifty years since the first operation of the removal of vermiform appednix was performed. It was performed in, I think, June, 1888, by Mr. (afterward Sir) Frederick Treves, upon myself at my father's home. I thought you might care to refer to it in your Journal as the operation subsequently became so casual. (I wish Mr. Treves and I had patented it.)"

The modern period dates from the work of Charles McBurney of America who in 1889 urged early operation, paid much attention to its pathology and described McBurney's point. By this diagnostic point, which has been of inestimable value, he clarified the diagnosis of the disease. Time, experience and advance in surgery has not diminished the importance of this contribution. The muscle-splitting approach for removal of the appendix goes under the name of McBurney.

One of the real pioneers of this period was John Ryerson Fowler of Brooklyn, New York, without whose name the history of appendicitis would be incomplete. Fowler's contribution to the subject, and which has given him world-wide fame, is Fowler's position, which he described in 1900. To quote his own words, "elevation of the (head of the) patient's bed 18 inches or more, thus causing by gravity the localization of infectious products in the pelvis where they are absorbed less quickly and whence they may be drained more readily." Extreme Fowler is sitting posture. Fowler himself succumbed to acute appendicitis.

John Murphy of Chicago, a great teacher of clinical surgery, has rendered inestimable service in the advancement of surgical knowledge. His fight on the question of appendicitis was dramatic. The disease was just becoming recognized for what it was, but the accepted treatment was to delay operation or to avoid it entirely. Murphy believed that delay was dangerous and for 14 years persistently accumulated evidence and finally completely overwhelmed the opposition. It was Murphy who made the point of "getting in quick and getting out quicker" in spreading general peritonitis. He developed the use of continuous saline solution per rectum which has come to be known as "Murphy drip."

In a series of similar cases Ochsner in America and Sherren in London proposed a method of tiding over, since called Ochsner-Sherren method, sometimes known as starvation treatment. The method comprises the withholding of everything by mouth, washing out of the stomach, continuous Murphy drip and injection of morphine. In 1904 both Murphy and Ochsner in America and Sherren in London published their epoch-making

papers, Murphy on "spreading peritonitis after rupture of the appendix" and Ochsner and Sherren on "starvation treatment."

Obstructive appendicitis came to be talked about with the work of Sir D. P. D. Wilkey of Edinburgh, who proved that by obstructing the lumen of the appendix the secretion accumulated behind the obstruction and resulted in a mucocele if uninfected or an abscess in the lumen of the appendix if infected by *Escherichia coli*. Such obstruction, Wilkey said, may be caused either by stercoliths, fibrous stricture or a spasm of the musculature of the appendix.

Since his time two forms of appendicular disease have been recognized: (1) Appendicitis which is supposed to start as an inflammation in the mucous membrane of the appendix. (2) Obstructive appendicitis with resulting distention and consequent rupture. At this point it is relevant to consider the obstructive type.

The normal secretion of the mucous membrane of the appendix is drained into the cecum through the appendicular opening which is guarded by the valve of Gerlach, the function of which is unknown. Books on anatomy and physiology are silent, but living anatomy gives a clue. In his book, "Stepping Stones to Surgery," Rowlings of St. Bartholomew's Hospital draws our attention to the fact that with appendicostomy, which is no longer in vogue, fecal fistula does not occur because the appendicular valve of Gerlach allows appendicular secretion to drain into the cecum but prevents fecal matter from entering the appendix. This suggests that it is the function of the appendicular valve to permit only one-way traffic under normal conditions. In 1927 I drew attention to the fecal matter seen in the lumen of many of the appendices removed and then expressed the doubt that fecal matter so seen is a normal content of the appendix. Since then, after 20 years of experience, I have come to the conclusion that fecal matter in the appendix is a foreign body and is bound to give trouble. I would like to quote Menninger Kummel who is emphatic in saying, "No normal appendix contains feces. If such is found, then an early nidus for pathologic changes is present."

If there is some disturbance or disease of the appendicular valve, it loses control over the one-way traffic and fecal matter is allowed to enter the appendix and irritate the mucous membrane. Further, the normal progress of appendicular secretion is blocked, and the appendicular muscles go into spasm in an effort to get over the obstruction. This results in colic.

Living anatomy throws light on other conditions of the appendix not described by the anatomist. I have studies and sketches made during 1025 operations on the appendix over a period of 14 years. Of these, nearly 50 per cent are my personal cases, the rest being those of my chiefs, colleagues and assistants. At each operation a pencil drawing was made. Folds and bands as yet not described by anatomists, showing no inflammatory reaction, being apparently of congenital origin, were found passing from the appendix to the cecum and to the parietal peritoneum in the right iliac fossa. These bands bend, fold up, twist or screw the appendix in various ways. These are not the classical bands of the anatomists, but are bands in relation only to the appendix. In my series the following five types of deformities caused by these bands were noted:

1. The appendix is bent into a wide U by a short mesentery, the free border being much shorter than the attached border. The free border feels tense as a bowstring.

2. An acute kink of the appendix converting it into a V.

3. A twist of the appendix into one or two turns of a corkscrew.

4. Proximal two-thirds free and the distal third twisted into a single turn of the corkscrew.

5. Proximal two-thirds buried in the wall of the cecum, the distal third free.

At some time these kinks must cause obstruction of the lumen of the appendix, depending on peristaltic movements and consequent changes in its position. Naturally, appendicular secretion is blocked at the kink, resulting in distention of the distal part. Waves of peristalsis endeavor to eliminate the obstruction and typical attacks of pain result and persist until the obstruction is relieved and the lumen is free. Should the obstruction not be relieved, secretion in the

distal part accumulates, increasing the distention. Such distention, if not relieved, may go on to rupture.

In a case of acutely bent appendix with the distal limb of the V drawn down by a series of tight bands to the right iliac fossa, the distal limb of the V is always thicker and harder with signs of greater vascularity than the proximal limb. It is significant that the moment the bands are cut during operation, the organ quickly straightens out and waves of peristalsis pass from the tip to the base. This is a guarantee that the obstruction at the apex of the V has been the cause of the trouble.

Fecal matter is not normal to the appendix. Once fecal matter enters and is unable to leave, it begins to dry up, a fecalith is formed which by virtue of its dryness and size cannot escape into the cecum.

Hence three factors are potent in causing obstruction to the free passage of the secretion of the appendix into the cecum: (1) Spasm of the appendicular valve of Gerlach; (2) bands and adhesions of congenital origin which kink and distort the appendix; and (3) fecal matter. These prevent the appendicular secretion from entering the cecum and cause distention of the appendix distal to the obstruction which in turn results in colicky pain. Depending upon the temporary or permanent nature of the obstruction the colic is either relieved or goes on to rupture of the appendix.

This leads one to ponder a little and ask whether the trouble with the appendix is obstruction first in all cases and inflammation second, following upon obstruction. Those cases which are styled inflamed appendix which subside without operation must be cases of temporary obstruction which are relieved. I am of the opinion that the primary factor in appendicular disorder is obstruction and not inflammation. Hence it is suggested that the term "appendicular obstruction" should take the place of "appendicitis."

SUMMARY

A historical survey is presented of the anatomy, pathology and clinical aspects of the appendicular disorder, particular emphasis being placed upon the part played by medical men of France, England and, later, the United States in increasing our knowledge of the subject. The function of the appendicular valve is considered. Obstruction to drainage of appendicular secretion into the cecum is considered the primary factor in the type of appendicular disease under discussion and it is suggested that the term appendicular obstruction probably will replace the term appendicitis in future.

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CASE REPORTS

Complete Rectal Prolapse

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A. S., female, 20 months, was seen Sept. 8, 1947, with a history of a red beefy tumor protruding from the rectum.

The mother gave the following history: About 2 months before, she noticed a cherry sized lump about the anus after a siege of diarrhea which had responded to the usual remedies. The lump seemed to disappear at times, only to reappear on crying or after defecation. The mass became progressively larger until it was as long as her index finger. For the week before the infant was brought for examination the mass remained outside most of the time. The infant seemed to be suffering from tenesmus, had lost weight and appetite and was very irritable.

Past history was noncontributory except for the diarrhea 2 months before and which had lasted 5 days. Birth weight was 6 lb., 9 oz. The first teeth came at 5 months, and the infant walked at 11 months. It was artificially fed; and was placed on whole milk at about 10 months. It rejected vegetables and cod liver oil.

Physical examination: The child was pale. Frontal fontanel was firm. The 16 teeth appeared to be in good condition. There was some flaring of the ribs at the costal margins. Lungs and heart were negative. Abdomen was soft and doughy, with the liver two fingers below the costal margin. Urethral and vaginal outlets appeared normal. Rectum: A red, beefy cone-shaped mass protruded 2 inches from the anus. It was covered with inflamed and thickened mucosa with areas of ulceration. The bowel opening was posterior to the apex of the mass and the rugae were prominent and circular. With some difficulty the mass was reduced but as the child cried continuously, it again prolapsed. The external sphincter readily admitted the thumb.

By elevating the legs and applying pressure the mass could be reduced. A narrow slit-like toilet seat was used which prevented separation of the buttocks when straining at stool. The child was on a nonsurgical schedule for a month but reduction could not be maintained by adhesive strips or other means.

Complete prolapse of the rectum, second degree, was diagnosed and surgical treatment advised. The patient was admitted to Mercy Hospital on Oct. 8, 1947, and operated on October 10.

Laboratory study showed nothing abnormal.

OPERATION

Sigmoidopexy, by the Bryant technic, was performed under anesthesia by vinethene with a preoperative injection of 1/300 gr. of atropine sulfate.

Incision. A 3-inch skin incision was made 1 inch medial and above Poupart's ligament on the left midway between the pubic spine and the left anterior superior spine. The external oblique fascia, internal oblique muscle, transversalis fascia were split in the direction of their fibers, and the peritoneum was cut obliquely. The parietal peritoneum was separated from the margins of the incision for about 1 inch, thus mobilizing two flaps that were utilized later in the closure.

Examination. There was marked mobility and redundancy of the rectosigmoid colon. No diverticuli were seen, nor pathology on the exposed ileum.

Technic of Operation. The sigmoid was pulled upward and outward and held taut with Babcock clamps, thereby reducing the prolapse. Also adjacent ascending colon was pulled downward medially, thus preventing the small bowel from coming in contact with the weak anterior wall of the rectum. Silk sutures on an atraumatic needle were used in anchoring the taut rectosigmoid to the anterior abdominal wall, the sutures going through the transversalis fascia, peritoneum, and longitudinal muscle band of the sigmoid of one side and the peritoneum and transversalis fascia of the other margin of the incision. Six interrupted sutures were used, and they were all placed before they were tied from below upward. The remainder of the skin incision was closed in layers with interrupted silk. The skin was closed with dermal.

The postoperative course was uneventful. The child was not restricted, in fact, she was up and about her crib three hours after the operation. The incision healed by first intention. Sulfasuxidine was administered and the bowels were allowed to move on the fifth postoperative day. The child left the hospital on the tenth postoperative day.

Examination two months after operation showed that there had been no reoccurrence of the prolapse.

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She had gained five pounds in weight, the skin incision was well healed, and the external sphincter was firm and admitted the little finger with normal resistance.

ANATOMY

The rectum is held in position by several supports, the lower portion by the levator ani muscles and covering fascia which fuse in the midline with the transverse perineii and coccygeal muscles, and the portion which forms the sphincters. Just above the levators and extending from the sacrococcygeal junction is the fascia propria of the rectum. This fascia completely surrounds the bowel, is situated just beneath the peritoneum and sends an extension around the prostate or the vagina to the symphysis pubis. Just above the sacrococcygeal junction are the triangular ligaments containing the middle hemorrhoidal vessels. These ligaments fix the rectum to the lateral pelvic wall. It is the weakening or congenital absence of one or several of the normal supports that allows for the complete prolapse of the rectum. The attachments are weakest in the anterior portions because of separation by the prostate, bladder or vagina.

Among the predisposing factors in complete prolapse are congenital anomalies, such as a long sigmoid, a low cul-de-sac, a decrease in the concavity of the levator ani and the recto-coccygeal and pubococcygeal divisions of the levator ani muscles. Neurologic conditions such as tabes, and longstanding diarrheas or constipation also may play a part in producing the prolapse.

COMMENT

Skinner and Duncan expressed the opinion that if the pelvic colon could be pulled up until the rectum was taut and held in this position, at least temporarily, the cavity between the bowel and the sacrum would fill in with scar tissue, would produce firm fixation, and would also allow the levator group of muscles to regain their tone, thereby correcting the rectal prolapse. The case presented seems to bear this out.

In the case presented complete rectal prolapse in a 20-months-old girl was successfully corrected by an anterior fixation of the recto-sigmoid colon to the anterior lateral abdominal wall.

Sección en Español

Rinocifosis*

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ENGLISH SUMMARY

It is not advisable to attempt to classify each type of nasal deformity with an operation for each; there are so many intermediate types of deformity which alter the plan of treatment. These factors are: (1) the artistic anatomy of the face, (2) the artistic anatomy of the nose, and (3) the laws of optics as applied to the artistic concept of the face. To see the effect of the hump nose deformity on the face as a whole, before and after correction, the face should be considered in its sagital plane and divided diagrammatically into four horizontal areas of equal vertical dimensions. The uppermost area, that reaching from the ideal hair line to the top of the head, is generally not considered in great detail. The other three areas are important: (1) from the ideal hair line to the root of the nose, (2) from the root of the nose to the junction of the nose with the lip (top to bottom of nasal base), and (3) from the columella to the bottom of the chin. The nose itself is divided horizontally into five areas. These are based on the anatomic structure and are important for surgical, esthetic, and psychologic reasons. Esthetically the hump nose has a specific optic effect on the appearance of the face. While the eyes of a normal face are about one eye-width apart, those of the patient with a hump nose always appear closer together than they actually are, as well as smaller and beadier than they are. The nose must be shortened, therefore, for two reasons: (1) correction of the actual length, and (2) correction for the apparent increase in length due to the removal of the hump. Concern over a hump nose and its correction is justifiable. The patient with a hump nose deserves planned surgical treatment; all operations cannot be alike. The patient's new face should not be the result of the surgeon's momentary caprice at the operating table. It should be one carefully designed, with all the relevant factors of artistic anatomy taken into consideration.

DEMONSTRAR que es posible esculpir el tejido viviente, necesitó que pasaran centurias, que acontecieran muchas guerras y la curiosidad de muchos médicos. Hasta las guerras modernas la cirugía plástica se practicó casi en secreto por unos pocos cirujanos. Existiá el extraño prejuicio de que se utilizaba la habilidad quirúrgica, más bien en propósitos innecesarios, cuando esta era usada para mejorar la apariencia personal. Pero cuando las operaciones plásticas se utilizaron para corregir las deformidades dejadas por los traumatismos recibidos en la guerra, y se vió que el mejoramiento cosmético se hacía acompañar de una tremenda majoría psicológica, entonces fué que se consideró a la cirugía plástica, aunque con reservas, cirugía legítima. Desde entonces mucho se ha escrito sobre este asunto.

Los accidentes automivilísticos han reemplazado a los altos explosivos de guerra como causa principal de las deformidades, y lo mismo se requiere la ingeniosidad del cirujano plástico en la alteración de la forma o la reconstrucción de los tejidos viables, en los desfigurantes accidentes automovilísticos que después de las heridas de guerra. Asi como también remodela las deformidades hereditarias.

La apariencia personal es hoy en día de principal importancia en el campo económico. Pero no es sólo eso, sino que los pacientes con deformidades, especialmente las visibles, poseen una desventaja psicológica además de la estética, pues se tornan melancólicos a tal extremo que disminuye notablemente su habi-

* *Vertido al castellano* por el Dr. O. Lescano, de la Habana, Cuba.

lidad para la obtención del sustanto diario.

La nariz está de tal forma situada, que las deformidades nasales son las más facilmente aparentes. Entre las deformidades nasales más comunes, que requieren operaciones plásticas, tenemos: la exagerada convexidad del dorso de la nariz, llamada por muchos rinocifosis (hump nose). Estas pueden ser clasificadas a grandes rasgos dentros de dos tipos: las congénitas y las traumáticas.

La nariz cifótica congénita, también llamada rinomagalia, es generalmente el resultado de una hipertrofia que envuelve el "puente caso" y a los cartílagos laterales ye alares.

En la que resulta de los traumatismos, la hipertrofia usualmente está limitada a los huesos y se caracteriza perfectamente por la protuberancia marcada de los dos quintos superiores del contorno nasal. Además, esta variedad presenta una prominencia mas aguda que las que se tienen congénitamente y, la hipertorofia es más ostensible vista desde el plano frontal, es decir, la porción superior es muy ancha.

Las rinocifosis muchas veces presentan además desviado el dorso de la nariz hacia uno de los lados y pueden ser atribuidas generalmente a traumatismos. Ambos tipos, congénitos y traumáticos pueden estar acompañados de otras anomaliás, tales como: tener la columnilla colgante, otras veces los orificios evertidos, el dorso colapsado o grandes desviaciones del tabique que desvián también al dorso. No es posible catalogar cada tipo de anomalía y clasificar un tipo de operación en cada caso, pues en la práctica son tantas las deformidades secundarias que se le presentan el cirujano y que él resuelve de acuerdo con las circunstancias, que mariá infinita la enumeración de los diferentes cambios de técnica que se ve obligado a introducir y que alteran cualquier plan general preconcebido de tratamiento.

Existe un tipo de deformidad nasal más llamativo que los otros, me refiero al producido por las resecciones submucosas del tabique, que por ser inexpertamente realizadas o mal indicadas producen su completo colopso.[1] Lo más grave es que algunos rinólogos, deliberadamente, practican resecciones submucosas con el fin de mejorar las rinocifosis. Este procedimiento está muy pocas veces, si alguna, justificado. Quizas si sus practicantes piensen que por lo menos ellos, al estirpar algun tejido nasal, estan reduciendo las dimensiones anteroposteriores de la nariz. Todo esto debe ser rotundamente condenado, pues el conocimiento de la anatomía nasal nos indica que solo dos posibilidades deben esperarse de tales procedimientos: que al paciente sea tan afortunado, que la resección no haya sido lo suficientemente extensa y su estética nasal no haya sido afectada; o que, por el contrario, el entusiasmo o capricho del operador haya sido tal, que la resección haya sido lo suficientemente extensa para dejar solo una estrecha cinta septal y en consecuencia las dimensiones anteroposteriores hayan disminuído en forma bizarra. El dorso de la nariz cederá por falta de soporte y eventualmente se colapsara, la parte osea, dejada sin tocar, se proyectará en prominente relieve, y las alas, dejadas sin su soporte normal que es al tabique, se aplastarán contra las mejillas, produciendo el perfil llamado "nariz aguilena." De manera que el paciente quadará con un defecto cosmética, lo suficientemente serio para atribular a la persona más indiferente de su apariencia personal y todo por al inexperiencia del cirupano tratando de conseguir un propósito tan pobremente concebido.

Mucho se has escrito sobre la técnica usada en las diferentes operaciones plásticas de la nariz, pero no se encuentra prácticamente nada acerca del arte anatómico envuelto en dichas operaciones. Sin embargo, en este caso el cirujano no solo necesita ser un maestro de la técnica quirúrgica, sino que así mismo le es necesario poseer un acertado criterio artístico de la anatomía de la cara. La deformidad nasal debe ser corregida de forma tal que sus líneas armonicen estéticamente con el resto de la cara del paciente; a pesar de lo cual, hay quienes como Straith [2] poseen su propria divisa mecánica con la que miden el grado de angulación del puente nasal y del de la columnilla.

No es posible aplicar el mismo patron a todas las caras, cada nariz debe ser remodelada de manera que encaje adecuadamente en la cara de su dueño, lo más exactamente posible. Los que no piensen así, háganse las siguientes preguntas; ¿Por qué son anti-estéticas las hipertrofias nasales, y por qué su corrección

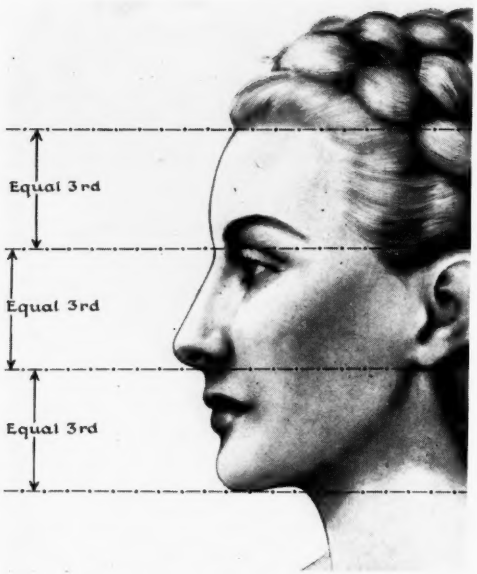

Fig. 1. Dimensiones verticales de la cara en total.

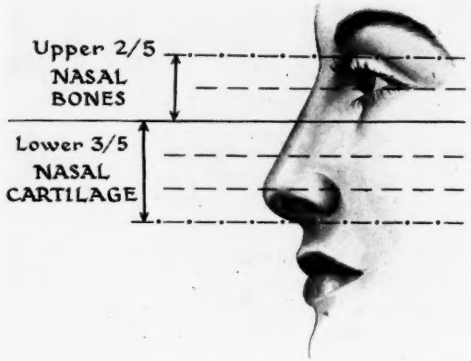

Fig. 2. Dimensiones verticales de la nariz.

produce tal mejoramiento en la apariencia del paciente?

Varios factores anatómicos de índole estética están involucrados. No conociéndolos, el cirujano solamente obtendrá buenos resultados accidental u ocacionalmente. Estos factores son: (1) Las leyes estéticas de la anatomía de la cara, en general; (2) la estética anatómica de la nariz, en particular y, (3) las leyes ópticas que rigen la belleza de la cara.

Al estudiar el efecto que causan las deformidades nasales en el todo de la cara y buscar los efectos beneficiosos obtenibles con la corrección, debe ser dividido el perfil diagramáticamente, su plano sagital por medio de cuatro planos horizontales a distancias iguales (Fig. 1). El área superior comprendiendo desde la línea del pelo hasta el tope de la cabeza, no es considerado generalmente en detalle. Las otras tres son importantes: (1) la comprendida desde la línea del pelo hasta la raiz de la nariz; (2) de la raiz de la nariz hasta la línea de conjunción con el labio, es decir de raiz a extremo inferior de la nariz y (3) desde la columela hasta la barbilla.

El diagrama anterior demuestra que la nariz ocupa exactamente el tercio medio de las dimensiones verticales de la cara y horizontalmente, generalmente corresponde al plano que ocupa la oreja, siento de las mismas dimensiones verticales que ésta.

Dibújese una "X" en la raiz de la nariz, una de las ramas paralela a la línea de la frente y la otra extendiéndose hacia abajo tocando tangencialmente a la barbilla. La nariz ideal nunca rebasará la rama "frontal," ni con la punta o el dorso. La "X" tendrá los ángulos agudos de 25 o 35 grados en las personas normales. La nariz normal tampoco rebasará la línea que cruza el surco nasolabial. Estos factores aunque resulten simples son estéticamente importantes.

Sigamos abundando en el tema de la armonía de las proporciones anatómicas de la cara y tendremos que el tercio inferior de la cara debe ser igual en el sentido vertical a cada una de la porciones superiores, como se indica en el diagrama. El área que ocupa el labio superior, idealmente debe ser un tercio del área correspondiente en las dimensiones verticales, a los labios y a la barba. En otras palabras: El tércio inferior de la cara se subdivide a su vez en tercios verticales, con el labio superior ocupando exactamente el tercio superior de la subdivision.

Sin embargo es conveniente mencionar aquí que estas dimensiones verticales pueden estar alteradas en su simetría por varios factores. La correspondiente a la frente es alterada ópticamente por la variación de la

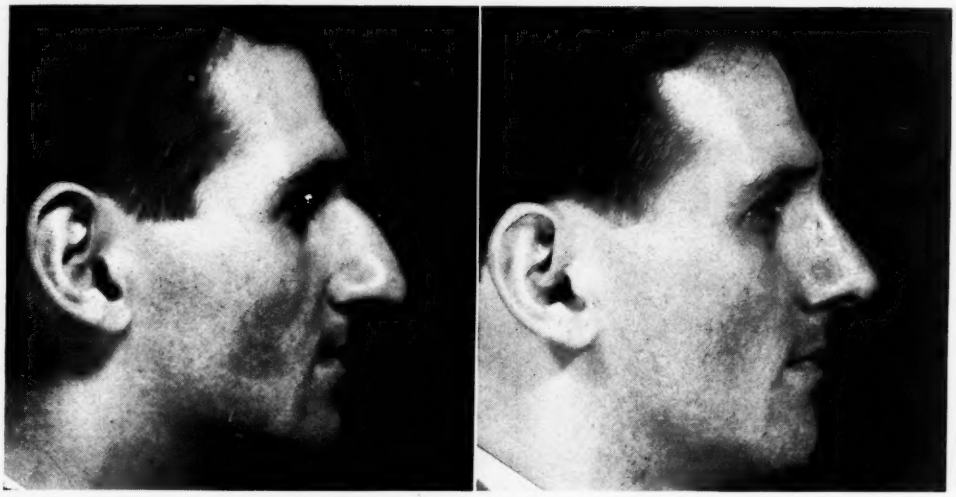

Fig. 3. Izquierda, hipertrofia generalizada de lar nariz. Derecha, depues de la operacion. Notese la nueva armonia del perfil.

Fig. 4. Izquierda, nariz encorvada y alargada. Ventanas masculinas. Derecha, correccion depues de la plastica. Notest un perfil mas juvenil cuando la nariz has sido acortada.

línea de la cabellera debida a una alopecía en progreso. El tercio pierde frecuentemente sus proporciones a causa de la absorción de los maxilares, causada por la pérdida de los dientes, el deterioro de los mismo o su eversión (incisivos superiores).

Estas alteraciones deben ser objeto de la mayor atención, y en el caso particular de la pérdida o deterioro de los dientes el tratamiento comprende el uso de puentes o planchas con dientes mas largos, etc.

La propria nariz se subdivide en cinco areas (Fig. 2), teniendo en cuenta razones de índole (1) quirúrgico, (2) estético y, (3) psicologicas. Estos espacios son verticalmente iguales. Los dos superiores incluyen exactamente los huesos proprios nasales, y los tres inferiores incluyen los cartílagos.

Fig. 5. Arriba, vista frontal de nariz encorvada y alargada, y depues de la correccion quiruriga. Notese como al disminuir la dimension vertical de la nariz le ha proporcionado armonia artistica y juventud a la cara. Observese ademas como los ojos lucen mas grandes.
Abajo, nariz alargada y encorvada, y depues de la correccion quirurgica.

Es bueno que recordemos aquí qe la nariz está sostenida en sus dos quintos superiores por los huesos nasales, rigidos e inflexibles, y en los tres quintos inferiores por los cártilagos laterales y el tabique. Ahora bien, el septum nasal es en realidad el sostén principal de las partes blandas, siendo los otros cartílagos elementos accesorios. De manera que, si se reseca parte del tabique en su porción anterior, la articulación vomeriana se convierte en el principal sostén de resto. En consecuencia, las resecciones resultan pobres cuando se realizan muy cerca de este punto.

Las rinocifosis traumáticas envuelven generalmente los dos quintos superiores de la nariz y casi siempre presentan exóstosis centrales o laterales por la excesiva formación de callo óseo, otras veces por desplazamiento de los huesos, que puede ser lo suficientemente extenso que envuelva también el de las porciones cartilagiosas.

Por otra parte en las rinomegalias hereditarias, como ya mencionamos anteriormente, es afectada la generalidad de la nariz y comunmente asociada a los que se la dado en llamar "columela colgante."

Cuales son los efectos ópticos específicos que en el aspecto de la cara producen las anomalías de la nariz, es de lo que nos toca por tratar ahora. En primer lugar diremos que en las personas normales los dos ojos están a un ancho de ojo apartes, mientras que en los pacientes con rinocifosis ellos lucen mas próximos, más pequeños y prominentes de lo que son en realidad. Es que la nariz en estos casos tiende a captar los rayos incidentes de luz, produce mayor sombra, todo lo cual tiende a acentuar su prominencia y crea ademas la ilusión de ser más afilada y delgada. Todo esto afecta la estética nasal de una forma que repercute en la personalidad del individuo, produciendo la impresión psicológica en sus interlocutores que convencionalmente se ha venido usando para personificar al hampón, al elemento maleante.

Pero además nos queden por señalar otros aspectos del mismo asunto. Cuando lo nariz es excesivamente larga y terminada por una columela colgante, hace lucir al labio superior más delgado y reducido en sus dimensiones verticales. La mayor parte de las veces esto es causado por las sombras, pues estéticamente el borde inferior de la nariz debe encontrarse con el labio superior formando un ángulo de 90° o más. Esto hace que, prácticamente, en casi todas las operaciones plásticas de rinocifosis, se requiera el acortamiento de las dimensiones verticales, porque la óptica hace lucir cortos los planos interrumpidos; y a los no interrumpidos, largos. Una nariz cifótica, si ya era larga, lucirá aun más después de nivelar el dorso. En conclusión, existen dos razones por las cuales la nariz debe ser acortada siempre durante las rinoplástias: (1) corrección del largo propio y (2) del mayor largo que aparenta tener después de ser removida la eminencia osteocartilaginosa.

Cuando se acorta la longitud de la nariz, es menester hacerlo en un diez por ciento de más, teniendo en cuenta el posterior descenso que ocurrirá debido a la delgadez y laxitud de los tejidos en juego.

Los detalles de los procedimientos quirúrgicos a sequir en la corrección de la deformidades nasales están descritos en la literatura. Sería bueno sin embargo recalcar aquí, algunos pasos imprescindibles en la obtanción de buenos resultados cosméticos. El primero es fotografiar al paciente y hacer una ampliación, siendo el perfil la pose más importante, pues sobre esta fotografía se trazan toda esa serie de planos ilustrados en los diagramas. Esta es la única manera de poder apreciar las verdaderas proporciones de la deformidad y sirve de guía excelente en el planeamiento de la operación correspondiente.

Lo siguiente es tomar una impresión o negativo en yeso, de la cara, es decir obtener una mascarilla que incluya la frente y los labios. De esta manera se pueden obtener impresiones positivas en gelatina y se la deformidad presenta aspectos poco usuales, se pueden calcular en ella los resultados de la corrección. Un modelo final en yeso se conserva para el archivo.

Refiriéndonos a la operación en sí diremos, en especial, que cuando la rinocifosis es acompañada además de anchura de la base, la eliminación de la prominencia debe ser seguida por la separación de los muñones óseos de sus suturas maxilares, por fractura y la reposición de los mismos, de manera que obtengamos una nueva pirámide a base más es-

trecha. La unión permanente de los fragmentos debe ser asegurada por mediación de una férula, que nos rinda un buen efecto cosmético. El tipo de férula depende de la clase re estabilización requerida.

Por último, es bueno advertir a cada paciente que la operación es siempre seguida por un pasajero edema de los párpados y que la inflamación de los dos quintos superiores de la nariz es la última en desaparecer.

Después que todos los edemas han desaparecido, varias semanas después de haber removido las suturas intranasales, se toman las últimas fotografías, comparándose entonces las nuevas dimensiones verticales con las anteriores.

En resumen diremos que la mayoría de las personas que buscan tratamientos correctivos a sus deformidades nasales, tienen excelentes razones para hacerlo. Muchas de ellas son extremadamente aprehensivas y sufren toda clase de vacilaciones y dudas, desde los exámenes de laboratorio iniciales de rutina hasta las últimas fotografías que significan el alta se muestran ansiossos, pero lo más importante es que son conscientes de su defecto y están perfectamente de acuerdo de lo justificado de la corrección. Por todo lo cual estos pacientes merecen un tratamiento quirúrgico planeado en cada caso, pues como se deja demostrado, todas las operaciones no pueden ser mecánicamente iguales.

La nueva cara del paciente no debe ser el resultado del capricho monetario del cirujano, satisfecho en la mesa de operaciones; muy al contrario, debe ser el armonioso conjunto de una series de órganos previamente delineados teniendo en cuenta los revelantes factores estéticos que envuelven la anatomía de la cara, juzgados por un artista.

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Tratamiento del Prolapso Uterino: Ventrofijacion

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ENGLISH SUMMARY

The author describes in detail his surgical treatment of uterine prolapse by ventrofixation of the uterus. He advocates the fixation, by suturing, of the posterior wall of the isthmus of the uterus to the anterior abdominal wall, and the shortening of the round ligaments by suturing them to each other ventral to the rectus sheath. He also advocates a perineorrhaphy in cases of extreme prolapse to cure the persistent lowgrade chronic infection of the genital tract.

ENTRE los problemes ginecológicos de más difícil resolución, debe contarse el tratamiento quirúrgico de los prolapsos genitales. Basta para demostrarlo el sinnúmero de operaciones que se han ideado; y eso mismo confirma los pocos éxitos tardíos que se obtienen.

Siendo un tema tan extenso y teniendo muy en cuenta, por otra parte, la indiscutible competencia médica del culto auditorio aquí presente, omito muchos detalles y tan sólo enumeraré los indispensables que sirvan de fundamento al tratamiento que propongo; y me referiré solamente al prolapso de la matriz, porque es el órgano que arrastra a los demás.

El útero está por una parte suspendido, y por la otra sostenido. Esta hace que se dividan en dos grandes grupos las intervenciones quirúrgicas para su tratamiento.

Las intervenciones vaginales, desde la simple colporrafia, hasta la colpocleisis, pasando por las grandes perineorrafias y el Shauta, no las tendré en cuenta porque me referiré tan sólo a la ventrofijación.

Dos condiciones se necesitan para que se efectúe el prolapso de la matriz: sea la primera una marcada retroversión. He visto, por ejemplo, varios casos de señoritas que han perdido su himen por la salida de la matriz debida a una retroversión antigua, de tal modo, que en el procedimiento de Shauta se evita el prolapso efectuando una anteversión forzada y el autor del procedimiento ni siquiera completaba su perineorrafia. El otro elemento que favorece el prolapso del útero es la insuficiencia perineal, pero yo creo que esta insuficiencia es secundaria para la producción del fenómeno, demostrándolo el mismo Shauta con su intervención.

Meditando acerca de estos detalles y con los fracasos tardíos de la múltiples intervenciones que pratiqué, llegué a la conclusión de que, para obtener un buen resultado, tratándose de ventrofijación, es indispensable, por una parte, que la sutura a la pared sea muy sólida; y segundo, que se haga una anteversión forzada.

El procedimiento que en la actualidad sigo y cuyos buenos resultados he podido apreciar, hasta después de diez años de la intervención, consiste en lo siguiente:

Hago una laparotomía suprapúbica, empezando la incisión unos seis centímetros arriba del pubis hasta el ombligo (esta incisión siempre la hago con cuchillo eléctrico). Siguiendo la técnica usual abro hasta el peritoneo (naturalmente, la enferma en Trendelenburg), meto la mano para tomar la matriz con un buen histerolabo, procurando no maltratar al órgano y lo llevo hacia arriba. Enseguida, despegando el tejido celular de la aponeurosis, perforo ésta y toda la capa abdominal con unas pinzas cerradas; tomo el ligamento redondo y lo saco por el ojal de la aponeurosis y, provisionalmente, fijo ese ligamento con unas pinzas de campo, sin perforarlo para qua no se maltrate. Idéntica maniobra hago del otro lado. Despúes, punto muy importante, paso hilos al través de la cara posterior del cuello, más bien en el límite del istmo con el cuerpo de la matriz. Estos hilos, tomándolos con aguja de Reverdin, los hago pasar de dentro afuera desde el peritoneo hasta el tejido celular subcutáneo, atravesando, naturalmente, la aponeurosis. Pongo la vacuna anticolibacilar (que siempre uso), dentro de la cavidad peritoneal y cierro la pared del vientre como en cualquier laparotomía. En seguida, anudo fuertemente los

dos hilos (catgut crómico del núm. cuatro), que han atravesado el istmo de la matriz, con lo cual consigo que la pared posterior de la matriz quede fija a la pared anterior del vientre. A continuación tomo los dos codos de los ligamentos redondos que están fuera de la cavidad y los ligo fuertemente, con varias puntadas, uno al otro, avivando con tijera las paredes de los ligamentos que suturo. Para terminar no queda más que poner unos puntos aislados en el tejido celular que, previamente, ha sido espolvoreado con sulfatiasol y se cierra la piel con grapas. Cuando la enferma presenta muy grueso el tejido celulograsoso, canalizo éste con una mecha de gasa. Se da por terminada la intervención

En las enfermas que tienen desgarros perineales muy grandes, es de aconsejar la perineorrafia, no por temor a que se reproduzca el prolapso, sino para evitar las persistentes infecciones vagino-uterinas que presentan las enfermas con vagina y vulva muy amplias.

La única intervención que por sus resultados muy tardíos puede ser comparada a la anterior, es la colpocleisis; pero no siempre se consigue una buena cicatrización, ya sea por la edad de la enferma, la flojedad de sus tejidos, etc., y, en cambio, tiene el defecto capital de que no debe usarse en mujeres casadas.

El procedimiento que propongo consigue una magnífica suspensión y una anteversión completa de la matriz, hechos que como expuse anteriormente, impiden la reproducción del prolapso, como la práctica me ha demostrado.

A propósito de la Gastrectomía Total

HERNANDO ANZOLA CUBIDES *
BOGOTÁ, COLOMBIA

La gastrectomía total consiste en la extirpación radical del estómago, abarcando desde el cardias hasta el píloro sin dejar huellas de tejido gástrica, parte esencial que la diferencia con la gastrectomía subtotal.

Las razones que existen en esta diferencia tienen su fundamento en estudios experimentales y cuya síntesis citaremos en seguida:

1. En animales de experimentación, después de ejecutada una gastrectomía extensa, la pequeña porción del estómago restante aumenta progresivamente de volumen hasta llegar a un tamaño casi normal por un proceso de distención mecánica en el esqueleto conjuntivo muscular del órgano (Mann).

2. Cuando la lesión no se ha extendido hasta el cardias, y es posible dejar una parte aun muy pequeña, los riesgos operatorios disminuyen, y la supervivencia es mayor.

INDICACIONES

Anteriomente los pacientes con lesiones graves del estómago no alcanzaban los beneficios de la gastrectomía total por el alto porcentaje de mortalidad de esta intervención. Actualmente se puede decir que existe un buen margen de seguridad.

La gastrectomía total, como único procedimiento operatorio en casos de degeneración maligna extensa del estómago no significa sino un medio paliativo. Los controles en enfermos operados después de un cierto tiempo solamente han favorecido un 60 por ciento de los operados.

En el cáncer esquirroso, lo mismo que en pequeñas carcinomas incipientes de localización alta, en úlceras gastrocias de la parte vertical de la pequeña curva con síntomas de degeneración neoplásica la Gastrectomía Total se justifica. En estos casos hemos intervenido.

CONDICIONES PARA REALIZAR UNA GASTRECTOMÍA TOTAL

1. Un estado general del paciente que permita considerar la posibilidad de resitencia y la indicación de la intervención.

2. La ausencia de metastasis o nódulos neoplasicos en el hígado.

3. Que la porción última del esófago esté libre. Una inmovilidad de este sector impide la anastomosis esófago yeyunal.

TÉCNICA

Hemos practicado siempre la anastomosis anterior, dejando un asa aferente bastante libre para evitar tracciones sobre la boca anastomotica, no se ha practicado en ningún caso la entero-eterostomía complementaria, y siempre se ha tenido cuidado en hacer puntos de sutura separados y los ángulos de la boca se han fijado al sector fibroso del difragma.

CASOS

1. Enfermo operado el 14 de enero de 1943 —Hospital de San José Bogotá—Paciente de 48 años. Fué operado para una úlcera-cancerificada, con infiltración de las paredes, como puede verse en las fotografías, y en la placa radiográfica correspondiente. El control radiológico que presen tamos fué hecho a los dos años de practicada la intervención.

2. Enfermo operado el 19 de agosto de 1944 —Hospital San José—Paciente de 60 años. Operado para úlcera alta de la pequeña curvatura con infiltración de las partes adyacentes. Control radiológico de las 9 semanas de practicada la intervención.

3. Enfermo operado el 6 de septiembre de 1944—Hospital de San José—Paciente de 46 años operado para carcinoma. Control radiológico a las 8 semanas de practicada la intervención.—Posteriormente fué controlado al cabo de nueve meses, y al cabo del año y dos meses ingresó de nuevo al hospital con metastasis hepáticas y allí falleció.

* De la Facultad de Medicina de Bogotá, Colombia.

4. Enfermo operado el 28 de diciembre de 1944—Hospital de San José—Paciente operado para úlcera estenosante del bulbo duodenal y úlcera infiltrante de la parte alta de la pequeña curvatura, con un sindrome doloroso muy agudo. Control de las doce semanas de practicada la intervención y posteriormente a los seis meses.

ESTADISTICA

Han sido operados de gastrectomía Total en nuestro servicio de Gastroenterologia del Hospital de San José, siete pacientes, y de los cuales han sobrevivido hasta la fecha 4.

COMENTARIOS

Enfermos de lesiones graves del estómago pueden beneficiarse por medio de la gastrectomía total.

Puede pensarse con buenas razones que la gastrectomía total practicada en pacientes cuya lesión gástrica ha sido diagnosticada precozmente está justificada.

Las úlceras gástricas con síntomas degenerativos, muy dolorosas o hemorrágicas, situadas en la primera porción de la pequeña curvatura justifican la gastrectomía, pues el índice de mortalidad en estos casos es en mucho inferior a la gastrectomía total para carcinoma.

Editorials

Ten Commandments for Surgery in Obesity

WHEN the first operation on the obese was performed seems to be a deep secret since there is no record of it anywhere. But Doctor Finney of Johns Hopkins, whom I have had the pleasure of knowing, at the turn of the century reported that he had removed about fifteen pounds of fat from a pendulous abdomen. Since then such operations have been performed many times, but here we are concerned only with operations on obese persons for reasons other than the removal of fat.

Adam and Eve may or may not have been obese. Since they knew nothing of calories and vitamins, I take it they were very healthy and normally nourished people. Had they been fat, they could not have covered their nakedness with fig leaves, since fig leaves of those days must have been even smaller than they are at present.

The first operation on any human being ever performed was on the first man, this same Adam. The book of Genesis says: "God caused a deep sleep to fall upon the man, and he slept; and He took one of his ribs, and closed up the flesh instead thereof. . . ."

From this simple statement I gather that Adam was not an obese man, otherwise the author would have made some remark about the seriousness of the operation and the difficulty experienced in closing the incision.

Coming down to practical considerations, I have ten commandments in regard to surgery in the obese, even though my name is not Moses nor are my commandments written on a slate which could be so easily broken.

1. Thou shalt not undertake surgery on any obese patient if you have no patience, fear of God and fat, since you will meet many technical difficulties: oozing may be profuse throughout surgery; you may have to work in a deep hole; your instruments may be too short for comfort; and the closure may be almost impossible to achieve.

2. Thou shalt not give just any kind of anesthesia to your obese patient, since in him the induction and maintenance of general anesthesia is more difficult. His short thick neck makes the extension of the head almost impossible. The time of surgery being longer, the narcosis must be kept up longer, and yet he is the one in whom narcosis should be shorter since his cardiovascular system is often damaged and vital capacity decreased. If you use local anesthetics, they may cause necrosis and infection because of the poor blood supply. Despite this, you must use more of your local anesthetic since his local response is poor. Parenteral anesthetics have their drawbacks, too, in his case. The dose may be calculated too high on a weight ratio basis, with disastrous results. Probably spinal anesthesia is safest in him, though you may encounter difficulties in getting into his spinal column because of the excessive adipose tissue which he carries on his back.

3. Thou shalt not bury sutures in adipose tissue, especially chromic catgut and silk, if you do not want a breaking down of your incision and prolonged drainage. Stay sutures may save you from this embarrassment. Wire sutures are excellent material in his case.

4. Thou shalt not operate on an obese patient for any abdominal condition without an unusually meticulous examination. Fat may obscure tenderness and muscle rigidity. Thick chunks of omentum may be mistaken for a tumor or abscess, while deep-seated tumors may be missed.

5. Thou shalt not operate on an obese patient in a hurry. His metabolism must be brought under proper control. It may even become necessary for you to institute thyroid therapy to maintain a more active circulation. His cardiac and respiratory reserve must be increased, since fifty pounds of extra weight would require fifty miles of extra blood vessels, plus additional work for a heart which is already embarrassed by excessive pericardial fat and upward pressure on the diaphragm by a fat-laden peritoneal cavity. Incipient nephritis, liver and cardiac insuf-

ficiency must be corrected. His blood chemistry must be studied. His blood protein and vitamin A and C content should be brought to a higher level to augment rapid healing and recovery. In doing these things you may be accused of owning clinical laboratories, meat packing plants and orange groves in Southern California.

6. If thou desirest to reduce his weight prior to surgery, you should not starve him in a matter of fact way as you may bring on a preoperative acidosis and also deprive yourself of tissues needed for closure of the wound since his rectus muscles are already diastatic and inadequate. Preoperatively he may need intravenous glucose if he has recently been on a reduction diet unless his blood sugar is well over 175 mg.

7. Thou shalt not strictly confine your obese patient to bed after surgery. Despite his weight, he has to be turned in bed more frequently and made ambulatory much earlier since he is more prone to acidosis, abdominal distention, peritonitis, pneumonia and pulmonary embolism.

8. Thou shalt not forget that nursing care is more valuable and necessary in his case and that your nurses need your sympathy since it is not an easy task to turn over or lift 250 to 400 pounds of jellylike humanity.

9. Thou shalt not forget that your obese patient needs to be guarded more carefully against exposure and changes in temperature and humidity in operating rooms and wards. On a hot day he may suffer a heat stroke in the operating room right before your eyes before you know it, because of greater loss of fluids and salts than occurs in any other patient.

10. Once thou hast agreed to operate on an obese patient, thou shalt not have any other thought but the saving of him despite himself. He has been digging his grave by his teeth and appetite, even though all his life he has been complaining of starvation. It is up to you to save him from this grave by proper preoperative and postoperative care. Otherwise his friends may ascribe his deeds to you and say, "You dug his grave for him."

S. H. BABINGTON

National Health Service*

WHEN I was a medical student I studied for a short period at Rigshospitalet, Copenhagen (Fig. 1). As a consequence, throughout my professional life I have yearned for a State hospital system akin to that of Denmark. My New Zealand postgraduate students tell me that on the whole they and their colleagues are not displeased with their State medicine. I must also record that I have long held the belief that medical students should press for a coordinated system of medical education, with one portal of entry to the profession—M.B. or M.D. (Britain).

With equal, nay, greater conviction, I feel that before contemplating entering a national service under the proposed system, every medical student should make arrangements through his Dean to be conducted around the Ministry of Health. There (except during the lunch hour, 12 to 3), in its labyrinth of offices, he will come face to face with the very gentlemen who served Mr. Willink so faithfully (Fig. 2).† He will see each and all, from youthful clerk to knighted departmental chief, signing beneath their motto, "I am, Sir, your obedient servant." He should observe closely their well-known "Passed-to-you" technic and, particularly, he should request to meet that "Double First" who can trans-

* First published in the *British Medical Students Journal.*

† Rt. Hon. Henry Urmston Willink, K.C., M.P., Croydon, North Division, Minister of Health, 1943–45. Reported to have visited St. Bartholomew's Hospital Medical School in company with Dr. H. Morley Fletcher in 1918 or 1919.

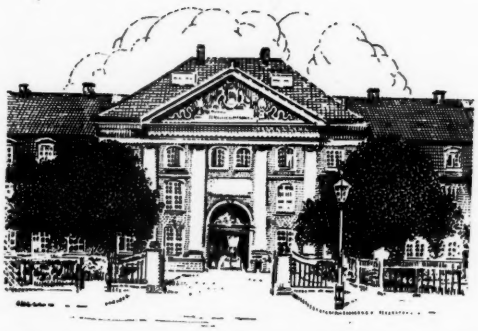

Fig. 1. The entrance to the (state-maintained) Rigshospitalet, Copenhagen. This Hospital may well be taken as a model for the reformation of British Teaching Hospitals.

Paragraph 3 (d) taken from Circular 2176 issued by the Ministry of Health

"Where a consultant or specialist normally visits a Cottage Hospital whenever there are cases requiring treatment within his specialty, his remuneration should be derived from the medical staff fund constituted by the capitation fees, but where this is not the case and he is summoned *ad hoc*, he will be eligible for a sessional fee."

Fig. 3. An example of a memorandum of the Ministry of Health. Trained specialist lawyers were unable to define its meaning.

Fig. 2. The small pile on the right is last week's prepaid telegrams awaiting reply. The pile on the left concerns the admission of surgical emergencies, and is somewhat larger than usual owing to midsummer recess. Much of this correspondence, we are told, would be avoided if the medical profession could understand the Ministry's memoranda.

late into English the Ministry's memoranda, for this person is unique (Fig. 3). He should tarry awhile in the form-*filling* (Fig. 4) and form-*filing* (Fig. 5) departments for, if he decides in favor of the proposed system, the greater part of his professional life will be spent in this absorbing work.

As he passes from office to office and from department to department he should dwell upon the fact that, right here before him, are the geniuses who, by sheer coordinated administrative prowess extending over more than twenty years, have succeeded in making the Tuberculosis Service what it is. At this juncture I should advise the student to seek refreshment lest, perchance, he becomes overwhelmed.

As he retraces his steps toward the exit

Fig. 4. The ability to select the appropriate form, and to fill it in correctly is regarded as an everyday accomplishment by some of the higher officials of the form-*filling* department. To these master technicians, trained from adolescence at the Ministry, many of the forms are intelligible.

Fig. 5. A corner of the form-*filing* department. Presumably, in due course this collected material will be available for vital statistics.

through this hive of super-executives (the like of which he has never seen before) a golden opportunity lies before him. He can single out and observe intently those great chiefs whom Mr. Aneurin Bevan [1] proposes to invest with powers to withhold your right and my right to practice our profession. In contradistinction to members of the Plumbers' Union, and in spite of the protests of Dr. Morgan,[2] it is proposed that we are to be denied the rights of the Magna Charta (Fig. 6); instead, these gentlemen [3] are to be our judges.

Fig. 6. Runnymede from the right bank of the River Thames. Apothecaries, barbers, physicians and surgeons have shared with members of other guilds, corporations, colleges and trade unions the legal emancipation granted by King John on June 15, 1215.

No, Sir, provided that scope is given for private enterprise, there is nothing fundamentally wrong with State medicine, but, if you knew as well as I know the officials of the Ministry of Health, I am sure that every nerve fiber in your body would cry out, "God forbid that they control me or my patients."

HAMILTON BAILEY

[1] Rt. Hon. Aneurin Bevan, Contemporary Minister of Health. Believed to have visited a sick friend in Ebbw Vale Hospital in 1928.

[2] Hyacinth Bernard Wenceslaus Morgan, M.D. (Glas.), M.P., Rochdale. Consulting Physician, Trades Union General Council.

[3] Data concerning Mr. Bevan's and Mr. Willink's first-hand information of hospitals' and medical students' requirements have proved extremely difficult to obtain.

NEWS NOTES

Chapter News

The Examining Board for Certification in Proctologic Surgery of the International College of Surgeons held its examinations in Chicago on February 10 and 11, 1948. The examination consisted of two parts. Part I was devoted to the written examination. Part II, devoted to the oral and clinical portions, included practical application of the basic sciences to the specialty of proctology.

The examiners in the basic sciences were Doctor Carl A. Dragstedt, Professor of Pharmacology and Physiology, Northwestern University Medical School; Doctor Samuel J. Fogelson, Assistant Professor of Surgery, University of Chicago Medical School, and Doctor Thomas C. Laipply, Professor of Pathology, Northwestern University Medical School and of the Wesley Memorial Hospital.

The Nebraska Section, United States Chapter, International College of Surgeons, met March 10 and 11, 1948, in Lincoln, Nebraska. Two full days of clinics, presentation of papers, and entertainment made the meeting an interesting one.

The Nicaraguan Chapter of the International College of Surgeons was launched at a meeting in January, 1948. This meeting occurred at the time of the visit to his native land of Dr. Desiderio Román, esteemed Member of the International Board of Trustees of the International College of Surgeons, and took place, by special invitation, at the Presidential Palace.

General News

Dr. Herbert A. Acuff, President of the United States Chapter, ICS, has been elected to a one-year term on the Board of Directors of the United States Committee of the World Medical Association. The purpose of this Association is the promotion of better understanding between doctors of the world; to act as a medium of exchange of information; to promote the interests of the medical profession; to assist all people of the world to attain the highest level of health; to cooperate with the WHO and UNESCO, and to promote world peace.

Dr. Custis Lee Hall, President-Elect of the United States Chapter of the International College of Surgeons, was appointed Consultant in Orthopedic Surgery to Bethesda Hospital, Baltimore.

Dr. Elmer Belt, F.I.C.S., has been appointed Chairman of the Board of Trustees of the Los Angeles County Medical Society for the year 1948.

Dr. Ulysses Grant Dailey, Sc.D., F.A.C.S., F.I.C.S., of Chicago delivered a series of lectures on the Surgical Treatment of Hypertension at the Meharry Medical College, Nashville, Tenn., February 9 to 11, 1948.

Dr. Morris Fishbein, Editor of the Journal of the American Medical Association, has been the recipient of the Certificate of Merit, awarded by President Truman, in recognition of his "outstanding efforts as Chairman of the Committee on Information of the National Research Council, which proved an invaluable contribution to the war effort of the United States." In notifying Dr. Fishbein of the honor, Comdr. G. E. Pierce of the U. S. Navy, secretary of the Civilian Awards Board in Washington, D. C., said the award is given to "civilians for outstanding fidelity and meritorious conduct which aided in the war effort against common enemies of the United States and its allies in World War II." The certificate was presented January 23 in a brief ceremony at the headquarters of the American Medical Association by Rear Admiral J. Cary Jones, Commandant of the Ninth Naval District, Great Lakes, Ill.

CORRECTION

It has been called to our attention that in the March–April, 1947, issue of the Journal of the International College of Surgeons, the name of Dr. J. M. de los Reyes appeared as Chief of Staff of the California Hospital, Los Angeles. This was an error. Dr. William Olds was, and still is, Chief of Staff.

Dr. Alfredo Gonzales Garcia, F.I.C.S., of Havana, Cuba, was elected to honorary membership

of the Society of Orthopedics and Traumatology of the Red Rose of Merida, Mexico.

At the meeting of the International Congress of Ophthalmology recently held in Havana the following were elected corresponding members of the Cuban Society of Ophthalmologists: Raul A. Chavira, Antonio Torres Estrada, Carlos Malabehar Pena, Feliciano Palomino Dena, Teodulo Agundis, Jr., Enrique Graue, Jr., and Daniel Silva. Professors Chavira and Torres are President and Vice-President, respectively, of the Mexican Chapter, International College of Surgeons, and the others mentioned are members of this body.

Professor Ricardo Labardini Nave, F.I.C.S., has been appointed Director General of Health, and Professor Francisco Fonseca, F.I.C.S., Director of the General Hospital of Mexico respectively.

Professor Alejandro Ceballos, Hon.F.I.C.S., Argentine Chapter of the I.C.S., was elected Rector of the Free University of Buenos Aires, a recently established institution.

Professor Oscar Ivanissevich, F.I.C.S.(Hon.), Ambassador to the United States, has been appointed Minister of Public Instruction in Argentina.

The Hungarian Medical Trade Union will add a celebration of its own to the commemorative ceremonies being planned for the centennary celebration of the Hungarian War of Liberty. To this end it is planning a Medical Week from September 4 to 12, 1948. The Hungarian Medical Trade Union invites members of the profession from foreign countries.

A communication from the President and the Secretary of this scientific body makes it clear that although every effort will be made to send information to persons and insitutions all over the world, a great part of the addresses was destroyed in the war years. Therefore the only way of reaching many is through notices such as this in medical journals and through this formal channel it extends its invitation to all members of the profession.

The Second Peruvian Congress of Surgery under the auspices of the Supreme Government of Peru will be held in Lima from March 15 to 20, 1948. This event was prompted by the Peruvian Academy of Surgery in collaboration with the following members of the Peruvian Chapter, International College of Surgeons: Dr. Alberto Sabogal, President; Dr. Cesar Heraud, Secretary-General; Dr. Jorge Romana and Dr. Esteban D. Rocca, Secretaries. "Surgery of Inguinal Hernia" will be presented by Professor Guillermo Gastañata, F.I.C.S.; "Management of Injuries in Peru," by Prof. Fortunato Quesada, F.I.C.S., and "Treatment of Pulmonary Abscesses," by Dr. Carlos Peschiera. In addition, there will be other program features, including conferences and surgical sessions.

The Société Belge de Gastro-Enterologie held a meeting in Brussels on January 31, 1948, at which papers were presented by Doctors J. Lederer, De Rom, Crousse and De Witte, Remouchamps, Verdoodt and Parmentier, Massion, and Crousse, Stoupel, Thiebaut and Van Diest.

A new exercise in medical cooperation between separate nations and a venture that is unique in surgical publications is presented by the agreement reached at the London Conference held in the Royal College of Surgeons, in May 1947, between representatives of the British and the American Orthopaedic Associations. This agreement becomes reality in the new *Journal of Bone and Joint Surgery* which will be shared equally by the Nations of the British Commonwealth and the United States of America. Each nation has set up its own Editorial Board and the representative issues will be edited by the respective staffs. The journal is the official publication of the American Orthopaedic Association, British Orthopaedic Association, Australian Orthopaedic Association, Canadian Orthopaedic Association, American Academy of Orthopaedic Surgeons. Applauded by New Zealand and the Union of South Africa, the journal is to be published every six weeks, some issues in London, some in the United States. Direction is by an Editorial Board of 32 members, 16 of which are American and 16 representing the members of the British Commonwealth of Nations. The first issue was February, 1948. Continued developments will be watched with interest.

Notification has been received of vacancies in medical appointments in Pakistan. Applications are invited for the posts of Professor of Midwifery and Gynaecology, King Edward Medical College, and Medical Superintendent, Lady Willingdon Hospital, both of Lahore, Pakistan. There is no restriction of nationality or domicile but applicants must be able to teach the subjects in English. Persons of non-Asiatic domicile will be appointed on 5 years contract. Candidates must possess, (1) M.R.C.O.S. (London) with postgraduate surgical qualifications F.R.C.S. (England) or M.S. of the British Universities, or equivalent or higher

qualifications. (2) Special training in midwifery and gynecology in an institution of repute and adequate teaching experience. (3) Experience of research work is considered an additional qualification. The age limit of not more than 46 years as of January 1, 1948, is relaxable for those who have special experience or outstanding qualifications. Pay is Rs. 800–50–1500 p.m., plus Rs. 150/–p.m.* as duty allowance for Medical Superintendent, Lady Willingdon Hospital. Initial pay in this scale may be fixed according to age, qualifications and experience. Advantage of Contributory Provident Fund admissible. Overseas pay at £/20– to £30/–p.m. and advantage of passage for non-Asiatics will also be admissible. Consultant practice allowed subject to right of Government to stop it in insurance of general policy. Applications should be made immediately to the Pakistan Embassy, Washington, D. C.

* Exchange rates: 1 dollar=Rupees 3. Annas 5 (1 Rupee=16 Annas).

Applications are also invited for the permanent posts of (1) Professor of Anatomy; (2) Professor of Pharmacology and (3) Professor of Pathology and Bacteriology to West Punjab Government at the King Edward Medical College, Lahore, Pakistan. Candidates must possess high postgraduate qualifications in the branches concerned, capacity to organize, direct and conduct research work, considerable experience in teaching, and knowledge of English. They must be not more than 45 years of age as of Dec. 31, 1947, but these limitations will be waived for those with special experience or outstanding qualifications. Pay is Rs. 800–50–1500 p.m., initial pay according to age, qualification and experience, plus overseas pay of £25–30 p.m. Applications for these posts should be sent at once to the Pakistan Embassy in Washington, D. C.

For details as to dental appointments available address inquiries to the Pakistan Embassy, Washington, D. C.

NEW BOOKS

DISEASES OF THE GALLBLADDER AND ALLIED STRUCTURES. By Moses Behrend, Philadelphia, F. A. Davis Co., 1947. If for no other reason—though there are many others—this book should be in every general surgeon's library because it presents extraordinarily detailed descriptions and illustrations of anomalies of the bile passages and blood supply. Every surgeon who has performed a number of cholecystectomies is aware of the startling way the unexpected may be opened to his view and the hazards inherent in assuming that the anatomic relations will be found normal. No less than 48 highly detailed illustrations are devoted to this vexing problem of aberrant vessels and anomalous ducts. The surgeon will be grateful to have them all in one book where he can study them at leisure, instead of being obliged to leaf through a number of texts.

Every aspect of gallbladder surgery is taken up with studious care, special emphasis being given to some. For instance, the uselessness of cholecystostomy is stressed, the procedure being classified as meddlesome surgery in chronic cholecystitis since it rarely circumvents a second operation. The author's meticulous technic of open operation in a practically bloodless field is fully described and illustrated step by step and does credit to his surgical acumen and skill. His method of nondrainage in selected cases is noteworthy.

The author's forty-five years of surgical experience are readily discernible in every chapter of this admirable book, and everything new in management and therapy can be found here if it is clinically acceptable. A particular merit is the conciseness of the writing which will be appreciated by the busy surgeon.

It is to be hoped that so excellent an anatomist, especially in the field of biliary surgery, might be persuaded to devote study to the sphincter of Oddi, regarding which reference in technical works always is vague and casual, and give the surgical world the benefit of such definitive research. The problem of biliary dyskinesia, too, seems to be growing instead of having been solved.

Oversights, such as the spelling of Levine instead of the correct Levin, when weighed against the intrinsic value of the work as a whole, are of minor consequence. This book can be highly recommended.

THE APPENDIX. By R. J. Love, London, H. K. Lewis & Co., 1947. Bearing in mind the sage of Ecclesiastes who said, "Of the making of books there is no end, and much study is a weariness of the flesh," the author has studiously avoided redundancies and theorizing, aiming to produce a book that was concise, well written, in which a subject could be quickly and easily found, and which focused upon the practical aspects of the subject. He has succeeded admirably.

It is surprising how much concentrated information can be bound between the covers of so small a book—pocket size, 181 pages—and the demonstration might with profit be studied by those who bring out wordier tomes of greater poundage without adding materially to the content. The author's expressed hope that the little manual might prove to be of use to younger surgeons upon whose shoulders falls the responsibility of emergency work should not be a vain one.

In this admirable little book are succinctly discussed the usual aspects of the subject (history, anatomy, diagnosis, differential diagnosis, appendectomy, postoperative complications, etc.) in an unusual way, and some more unusual approaches, such as Treatment of the Appendix Mass, General Peritonitis, Appendicostomy, Less Common Diseases of the Appendix, and Obstetrical and Gynecological Considerations, have been added and developed in an original manner.

Here within small compass is all the information, and more, one could gather from a dozen works on general surgery, from each of which one would have to glean the bits to put together as a whole. This little book cannot be too highly recommended. The only criticism one might offer applies to the publisher rather than the author. The editors should have been more alert to catch such oversights as the appendicectomy where appendicostomy was meant, carbohydrated diet where carbohydrate was intended and similar errors for which editors properly are responsible. But even such oversights cannot mar the intrinsic merit of this little contribution to surgery.

OSTEOTOMY OF LONG BONES. By Henry Milch, Springfield, Ill., Charles C Thomas, 1947, 294 pp. Orthopedic surgeons will welcome this little book by Dr. Milch which confines itself to a discussion of osteotomy as one of the simplest and most useful of all methods developed for the treatment of skeletal deformity and disability. The book is well printed and arranged and adequately illustrated.

SOURCE BOOK OF ORTHOPAEDICS. By Edgar M. Bick, Ed. 2, Baltimore, The Williams & Wilkins Company, 1948, 540 pp. This very interesting book should be read by every orthopedic surgeon. For those surgeons who desire to know *who did what first* the book contains excellent information. It is extremely abundant in its biographies and in its index. It has been completely rewritten from cover to cover and contains more additional information than the first edition. Many illustrations have been added which makes it more interesting reading than the first edition.

DISABILITY EVALUATION: PRINCIPLES OF TREATMENT OF COMPENSABLE INJURIES. By Earl D. McBride, Ed. 4, Philadelphia, J. B. Lippincott Co., 1948. The contents are divided into 36 chapters and provided with an excellent index and bibliography. The careful system utilized by the author for evaluating disabilities is clearly explained and there are many charts illustrating his evaluations on almost every conceivable type of case. This book should be in the library of every orthopedic surgeon or industrial surgeon. It would be worth its weight in gold to the claim adjuster of insurance companies. It should be on the shelf of every personnel manager of every large corporation. I know of no other book that deals with this subject, which contains anywhere near the volume of valuable information that can be found in this new fourth edition of Dr. McBride's.

CLINICAL RADIOLOGY. A CORRELATION OF CLINICAL AND ROENTGENOLOGICAL FINDINGS. Edited by Captain George Utley Pillmore, MC(S), USNR, Philadelphia, F. A. Davis Co., 1946, 2 vols., 708 pp., 2484 illustrations. This excellent work is the result of the collaboration of an impressive group of 58 contributors. The editor states that the purpose of the work is to present applied radiology in a clinical manner, stating that the "mere description of shadows . . . is a thing of the past." While the two volumes aim at diagnosis an important secondary aim is medical and surgical treatment. These two volumes, excellently arranged and lavishly illustrated, would seem to be invaluable to roentgenologists, internists and surgeons, and should find a place in every hospital library.

ESSENTIALS OF OBSTETRICS AND GYNECOLOGY. By William Albert Scott and H. Brookfield Van Wyck, Philadelphia, Lea & Febiger, 1946. In this comparatively small book the authors discuss the fundamentals of obstetrics and gynecology. Some subjects, however, have been given too slight consideration. For example, seven pages and six illustrations are given over to congenital abnormalities which are uncommon, whereas only one page is devoted to the menopause and three and a half pages to the subject of sterility. In the chapter on "Pathological Conditions of the Vagina" only one sentence is devoted to mycoses and nothing is said of the symptomatology, diagnosis or treatment of this condition which is not uncommon. There is no chapter on endocrinology, but there are excellent chapters on conditions where the endocrine glands play a predominant role as in menstrual disturbances and sterility.

Aside from these and other minor inequities in the allotment of space, the authors are to be complimented on the way they have covered the important facts about obstetrics and gynecology. The first 50 pages are devoted to the anatomy and physiology of the female genital tract, the next 180 pages take up normal obstetrics, abnormal obstetrics and operative obstetrics, and the remainder of the book is devoted to gynecology.

In their recommendations covering treatment the authors are conservative in accord with the teaching and practice of nearly all the leading obstetricians and gynecologists.

The book is very well written and the type is clear, hence reading it is easy. The illustrations are abundant. The drawings are beautiful and instructive, and the photographs are clearly reproduced. Both the authors and the publisher have done their job well. The book should prove highly useful to students and practitioners as a supplement to the large textbooks which deal with obstetrics and gynecology.

PRIVATE ENTERPRISE OR GOVERNMENT IN MEDICINE. By Louis Hopewell Bauer, Springfield, Ill., Charles C Thomas, 1947. This book gives a wealth of background on government medical legislation abroad, from which the reader can draw his own conclusions. The author carefully reviews all attempts in medical socialization by social reformers in this country. Compulsory insurance in this country is backed by the Committee on Research for Medical Economics with Michael M. Davis,

Ph.D., as chairman, which apparently is financed by the Rosenwald Foundation, the Albert and Mary Lasker Foundation, the Rockefeller Foundation, and private donors. The Committee's basic formula follows the International Labor Organization recommendation which is the establishment of chairs of socialized medicine in the medical schools and classification of physicians as skilled workers. Some of the witnesses before the senate committee favoring the Wagner-Murray-Dingell Bill were on the Federal payroll and had not even read the Bill, their statements having been prepared by the Federal Bureaus.

The author points out the failures of government medicine abroad and the deficiencies in government hospital administration in this country. The U. S. Government has 78 per cent of the total bed capacity, but only 39 per cent of the admissions. The people in this country spend on medical care $22.50 per person per year but on alcohol $37.50. What we need is not socialized medicine, as the author points out, but better medical education for the general public, protection against nostrums and quackery, improvement of economic standards of communities, preventive medicine for all, establishment of county health departments and care of the indigent by grants-in-aid. The low income groups would be cared for through such method as is provided in the Taft-Smith-Ball-Donnell Bill now before the Senate. And the rest of our people are and will be able to be taken care of through voluntary health insurance. There is urgent need of amalgamation into one agency of all government departments, bureaus and administrations dealing with health.

The more one reads the book the more he is convinced that the author deserves a great deal of credit for the magnificent way in which he handles such a difficult and controversial subject. It is remarkable how much factual, historical and legal information is packed in its 201 pages. Every physician or layman should read it. The appendix, the Taft-Smith-Ball-Donnell Bill (s545), should be studied by everyone interested in medical legislation.

MORELL MACKENZIE, THE STORY OF A VICTORIAN TRAGEDY. By R. Scott Stevenson, New York, Henry Schuman, 1947. Readers interested in medical history, especially when the subject has influenced the course of world history, will wish to acquire and read this book. It was Morell Mackenzie who was called to the Continent in consultation as to the nature of the laryngeal growth of Emperor Frederick III who reigned only ninety-nine days and, in dying, took with him the hopes of a liberal government in Germany and gave it instead Kaiser William II. The book is in the nature of a defense of the stand Mackenzie took against operation, based as it was on the limited medical knowledge and technical skills of the day. The author's defense is bolstered by extensive research among papers, letters, telegrams, and other sources hitherto not available. Regardless of one's own opinion of the interpretation, the book is worthwhile because of the completeness of historical background and source material.

AMIABLE AUTOCRAT, A BIOGRAPHY OF DR. OLIVER WENDELL HOLMES. By Eleanor M. Tilton, New York, Henry Schuman, 1947. To most literate Americans outside the world of medicine the physician is lost in the "Autocrat of the Breakfast Table." To medical men the man of letters is lost in the physician whose name is linked with the theory of the contagiousness of puerperal fever. The present book, completely documented, presents a picture not only of the physician and the writer but of the Boston Brahmin as well. Upon one point especially the thorough research by the author proves highly interesting. As a rule historians give Dr. Holmes (coincident with Semmelweis) credit for pointing out the contagiousness of puerperal fever and for suggesting that it is carried from bedside to bedside by physicians, midwives and nurses. Here it is made clear that before Dr. Holmes laid himself open to professional criticism and antagonism with this theory he had gathered records from the literature and other physicians. He found that "as early as 1773 Charles White of Manchester had concluded that puerperal fever is contagious and advised precautions," and that Robert Collins in 1835 reduced the mortality rate in a Dublin hospital by the use of disinfectants. It was the force of Holmes' presentation, supported by these collected facts, clothed in his eloquence and "informed by passionate indignation and unshakable conviction" that have had the ultimate result of crediting him with the original idea, losing in the background of history those who went before.

This book should be in the library of those interested not only in medical biographies but in many-faceted personalities as well. It is thoroughly documented, well written and illuminated by flashes of humor.

The twelfth edition of **Practical Physiological Chemistry** [1] is a complete revision of the subject matter of the book. Many chapters have been entirely rewritten, all of them have been reexamined to insure their application to present-day knowledge, and the clinical and theoretical phases have been strengthened. New sections have been added, such as those on the polarograph; isotopes; sulfa drugs; metabolic antagonists and antibiotics; the Warburg tissue-slice procedure; theory and practice of photometric analysis; electrophoretic fractionation of the plasma proteins; composition of foods; and on the various vitamins whose importance has become recognzed since the last edition, together with the clinical relationships of certain of them. Many new quantitative procedures for blood and urine analysis have been added.

Particular attention has been paid to the illustrations; some were redrawn and many new ones were added. The book remains the standard classic of its field.

Sir Alexander Fleming [2] has ably covered the subject of penicillin therapy from all possible angles. This book is an authoritative treatise, which should be a guide for both the general practitioner and the specialist.

The book expresses the views of each independent contributor, and as such reveals some interesting variations in opinions expressed. The following contributors are included:

A. L. Bacharach, M.A., F.R.I.C.
B. A. Hems, Ph.D., F.R.I.C.
H. Berry, B.Sc., Ph.C., Dip. Bact. Lond., F.R.I.C.
L. P. Garrod, M.D., F.R.C.P.
W. Howard Hughes, M.D., B.S.
A. E. Porritt, C.B.E., M.Ch., F.R.C.S.
G. A. G. Mitchell, O.B.E., M.B., Ch.M.
R. Vaughan Hudson, F.R.C.S.
Ronald V. Christie, M.D., D.Sc., F.R.C.P.
A. Hope Gosse, M.D., F.R.C.P.
T. Holmes Sellors, D.M., M.Ch., F.R.C.S.
Rainsford Mowlem, F.R.C.S.
V. H. Ellis, F.R.C.S.
Ian Aird, Ch.M., F.R.C.S. ed.
E. C. B. Butler, F.R.C.S.
R. M. Handfield-Jones, M.S., F.R.C.S.
Leslie Williams, M.D., M.S., F.R.C.S., F.R.C.O.G.
Donald Paterson, M.D., F.R.C.P.
Martin Bodian, M.D. Vienna, L.R.C.P. & S.Ed.
A. Dickson Wright, M.S., F.R.C.S.
G. L. M. McElligott, M.R.C.S., L.R.C.P.
Arnold Sorsby, M.D., F.R.C.S.
John F. Simpson, F.R.C.S.
A. C. Roxburgh, M.D., F.R.C.P.
E. Wilfred Fish, M.D., D.D.Sc., D.Sc.
Reginald Lovell, M.Sc., Ph.D., M.R.C.V.S., D.V.S.M.
G. B. Mitchell-Heggs, O.B.E., M.D., F.R.C.P.

These differences in opinions add, rather than detract from the merits of the book as a whole, indicating that the future may bring quite some experimentation concerning dosages and methods of administration; the fields of research are still open and drastic changes in indication, contraindication and administration of penicillin may be forthcoming.

The division of the book into a general and a clinical field is of advantage; for the research man, the first section will be of primary interest, to the general practitioner and specialist, the second section covers his fields. For full understanding of the subject, of course, both sections should be studied. This is furthermore one of the few, if not the only, book in which the more purely medical sections are closely combined with dental and veterinary surgery. It is a must for the practitioner's medical library.

In this profound study of the Surgical Anatomy of the Facial Nerve and the role of conservation of the facial nerve in total parotidectomy, **Dr. Vicente J. Bertola** [3] presents a most detailed and meticulous description of the anatomy of the course of the facial nerve. He follows the nerve

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[1] Practical Physiological Chemistry. Philip B. Hawk, Ph.D., President, Food Research Laboratories, Inc., Long Island City, New York; Bernard L. Oser, Ph.D., Director, Food Research Laboratories, Inc., Long Island City, New York; and William H. Summerson, Ph.D., Associate Professor of Biochemistry, Cornell University Medical College, New York City. 1323 pp., 329 illustrations plus color plates. The Blakiston Company, Philadelphia, 1947.

[2] Penicillin and Its Practical Application. Under the General Editorship of Professor Sir Alexander Fleming, M.B., B.S., F.R.C.P., F.R.C.S., F.R.S. 380 pp., 59 illustrations, many tables. The Blakiston Company, Philadelphia, 1946.

[3] Anatomia Quirurgica del Nervio Facial. Vicente J. Bertola, M.D. 271 pp., 104 illustrations. Imprenta de la Universidad Cordoba, Republica Argentina, 1947.

from the outside in, beginning with superficial dissections and ending with exposure after the parotid gland has been removed, thus presenting all the various planes. The preparations used are excellent, and the superimposition of outline drawings of the nerve on tissue paper on photographs of the corresponding anatomic preparation is most valuable for keeping in mind the various landmarks and branchings of the facial nerve. The 16 different anatomic preparations are of heads of different cephalic index, thereby well illustrating the varied findings in such different heads. Dr. Bertola describes various technics of parotidectomy and gives a detailed, step-by-step description of his personal technic, which does least damage to the facial nerve. The book is recommended as a most scholarly work.

This literary gem [4] is a transliteration, into modern language and analogy, of the book by the same title written in the seventeenth century by the Spanish Jesuit priest, Baltasar Gracian. Dr. Eisenschiml has added to the interpretation his own pungent wit and seasoned philosophy, with punch-lines which are like sharp thrusts of the scalpel.

For instance: ". . . generosity is wasted, if not accompanied by a heart felt desire to do good. Flavor your gifts with sympathy, and you will be loved, for hearts speak to other hearts in a language all their own, unintelligible to those who listen only to the jingle of coins. The names of philanthropists, engraved in marble memorials, soon lose their meaning, but the names of Florence Nightingale and Clara Barton will live forever in the annals of humanity."

Or: "Prince Metternich, Austria's greatest diplomat, had a simple formula for meeting difficult situations. 'Let us drink tea and wait.' He drank much tea; he also had a long and successful career."

Or: "The wittiest repartee is worthless after the party is over."

For relaxation and rich pleasure this book is highly recommended.

Based upon 100 unselected and consecutive personal cases of advanced abdominal cancer, **Dr. Brunschwig** [5] presents proof that the boundaries of operability can be extended to a far greater degree than has yet been attempted. Complete case histories were taken of these 100 patients, and a most thorough and careful follow-up study of each case was considered of primary importance. Operative mortality in the group was 34 per cent. Of the total group, 17 per cent received no relief from the surgical operations performed; 30 per cent received some palliation. The remaining 19 per cent survived for long periods following radical surgery, 13 patients being still alive and well with an average survival time of 40 months. Dr. Brunschwig states that his principal object was to gain some impression as to what might be accomplished by radical extension of operative surgery for the "inoperable." He concludes that the only limits to operative resection of intra-abdominal structures are the limitation afforded by the minimal requirements of certain structures for normal physiologic activity, viz., a portion of one adrenal, possibly 30 per cent of the small bowel, sufficient renal tissue for adequate urine secretion, etc.

The book is recommended to all thoughtful surgeons as a stimulant for new concepts of operability of advanced abdominal cancer, still one of the most common forms of cancer in man.

Fractures, Dislocations and Sprains, [6] by **Key** and **Conwell,** appears now in its fourth edition. This text cannot be excelled as an authoritative and practical guide for the student, general practitioner and surgeon. Fractures and orthopedic problems can be met with the confidence that the conservative and generally accepted form of treatment will be outlined in workable form. This edition brings you many new ideas in the management of compound fractures, in the use of penicillin and the various forms of

[4] The Art of Worldly Wisdom. Otto Eisenschiml, LL.D., Duell, Sloan & Pearce, New York, 1946, 160 pp.

[5] Radical Surgery in Advanced Abdominal Cancer. Alexander Brunschwig, M.D. 324 pp., 118 illustrations. The University of Chicago Press, Chicago, 1947.

[6] The Management of Fractures, Dislocations and Sprains. John Albert Key, M.D., and H. Earle Conwell, M.D. C. V. Mosby Co., St. Louis, Mo.; 1946.

chemotherapy. The chapters on "Injuries of the Spine" and "Injuries in the Region of the Hip" have been revised and are especially complete.

In keeping with the conservative nature of the book, the section on external fixation is passed over briefly. Although the authors disapprove of external fixation in general, they conclude fairly that the external fixation devices are successful in the hands of those who have considerable skill in their use.

Such a book as the **Women in Industry,**[7] by **Anna M. Baetjer,** has a tendency to defy the usual attempts at review. Representing as it does the ultimate results of a formidable amount of study and research over a considerable length of time and in several different countries, the contained material is too vast and varied to be outlined or even indicated in the space usually allotted to such an effort.

Women have always worked in industry to a certain extent, especially during times of war. They have never done so as extensively, especially in the so-called "heavy industries," as during the war just ended. Up to the past five years, very little effort had ever been made to determine accurately just what effects such work had upon their health and well-being. Much was learned during these war years about many phases of this vast problem; much also remains to be learned. This book is an exhaustive compilation of most of the information obtained both in the United States and Britain. It is divided into some half dozen sections covering such general topics as the ability of women to work and suitable working conditions for them, sick-absenteeism, accidental injuries, occupational diseases, gynecological and obstetrical problems, menstruation, mortality and fertility. The final seventy-five pages are devoted to appended tables on occupation distribution, suitable occupations and labor laws affecting women. There is also a very complete bibliography of more than twenty pages and an extremely detailed index.

The appeal of such a volume is not wide, but to those to whom such problems are of practical importance, such as plant and industrial physicians, personnel managers, industrial plant superintendents and others who have occasion to employ women in any other occupations than the conventional "women's jobs" (teaching, nursing, domestic service and clerical work), it should prove extremely enlightening, informational and generally valuable as an authoritative work for reference.

[7] Women in Industry; Their Health and Efficiency. Issued under the Auspices of the Division of Medical Sciences and the Division of Engineering and Industrial Research of the National Research Council. Prepared in the Army Industrial Hygiene Laboratory. Anna M. Baetjer, Sc.D. 344 pp. W. B. Saunders Co., Philadelphia, Pa.; 1946.

ABSTRACTS OF CURRENT LITERATURE

Fatal Air Embolism During Mastectomy, C. Langdon Hewer and Herbert I. Coombs, Brit. M. J., Jan. 17, p. 97, 1948. Operation and anesthesia had proceeded without incident until the breast had been removed and dissection of axillary glands was taking place. Some hemorrhage took place from the axillary vein and a few minutes elapsed before a ligature was passed around the vein and tied. At the moment of ligation the patient gave a sharp inspiration and stopped breathing. Methods of resuscitation, at first apparently successful, eventually failed. Postmortem examination substantiated the clinical diagnosis of embolism as the cause of death, though none of the signs of embolism, particularly no hissing sound as air entered the vein, had been present. It is suggested that diagnosis of air embolism must often be missed unless a postmortem examination is carried out, and that even at necropsy it may be missed if not previously suspected, because of the small amount of air involved. In this case, after careful necropsy, death was ascribed to air embolism and fibrin formation in the right heart.

Endometriosis as a Cause of Intestinal Obstruction, P. McGuff, et al., Surg. Gynec. & Obst. **86**:273, March, 1948. Sixteen cases of intestinal obstruction caused by endometriosis were studied. If the large bowel is involved, severe constipation, lower abdominal pain and distention are practically always present; if the obstruction is ileal, vomiting occurs, if colonic, obstipation is more frequently present. Menorrhagia and metrorrhagia occur as symptoms of associated pelvic disease rather than as symptoms of endometriosis. In diagnosis the clinical history, digital examination, sigmoidscopic examination and roentgenography of the colon and terminal portion of the ileum are important. When the lesion is in the lower bowel the two most important adjuncts in diagnosis are sigmoidoscopy, with the presence of an extrarectal mass and an intact puckered mucosa, and a roentgenogram of the colon with the presence of a long, inconstant filling defect with sharp regular borders and an intact mucosa. Endometriosis causing obstruction of the ileum presents a less characteristic clinical picture than that in the sigmoid and below. In the ileum the mechanism of obstruction was usually due to kinking caused by the endometriosis, while below it was more often due to impingement of the endometriosis upon the lumen of the bowel. Microscopically endometrial glands and stroma were found in all layers of the intestinal wall, and fibrosis around the endometrial glands and stroma was characteristic in all the sections.

Treatment is surgical. If the ileum is involved ileal resection is necessary, with or without preliminary ileostomy or panhysterectomy as indicated by the pelvic pathology. When the colon is involved, bilateral oophorectomy or panhysterectomy is sufficient in most instances. Prognosis is excellent and surgical mortality nil.

Closure of Colostomies, H. Haffner, and R. B. Lynn, Ann. Surg. **127**:243, Feb., 1948. Experience with 72 consecutive colostomy closures by end-to-end anastomosis or a modification of the Pauchet technic, has resulted in a preference for the latter in transverse closure in descending and sigmoid colons. With this type of closure the withholding of food postoperatively is unnecessary, postoperative discomfort is minimal, early ambulation is accomplished, and wound infection, leakage or failure of closure, or obstructive symptoms is unknown in the experience of the authors. Briefly, the technic consisted in encircling the colostomy stoma by an elliptical skin incision, leaving a cuff of skin about ¼ inch around the mucosal edge. The incision is deepened in an anatomic manner by sharp dissection through all the layers of the abdominal wall down to the peritoneum which is opened along the medial aspect of the colostomy. The peritoneal incision is continued by sharp dissection so that it completely encircles and frees the afferent and efferent limbs of the colostomy. With gentle traction on the bowel, further mobilization is continued as far as is necessary to provide an adequate length of bowel for the anastomosis, and to permit, if necessary, resection of the colostomy or of segments of bowel deformed by secondary fistulas, extensive scarring or granulomatous masses. Proper mobilization permits complete delivery from the abdominal cavity of the afferent and efferent limbs of bowel to be used in the anastomosis. The wound edges and the peritoneal cavity are protected by two large saline packs tucked snugly down into the wound around the bowel. All subsequent surgical procedures are then carried on entirely outside the abdominal cavity and the operative wound. The anastomosis is completed after complicating conditions in the operative field have been corrected. Upon completion of the anastomosis the bowel is carefully replaced within the peritoneal cavity,

so as to avoid kinking or twisting and the wound is closed in layers without drainage.

The Cytologic Method as an Aid in the Diagnosis of Gastric Carcinoma, Ruth Graham, et al., Surg. Gynec. & Obst. **86**:257, Mar., 1948. The cytologic method may prove of value in bringing cancer of the stomach to operation earlier than in the past. By this method a fasting specimen of gastric secretion is obtained by aspiration, sent to the laboratory *immediately* since even a half hour's delay is sufficient to effect digestion of the cells, with loss of cellular characteristics. After immediate centrifugation the sediment is spread on a glass slide and fixed for 15 minutes in ethyl ether and 95 per cent alcohol. The slides are then stained by Papanicolau's method. By this method only 2 of 7 resectable cases were missed; one was a scirrhous carcinoma of the wall of the stomach. Such a tumor could not be expected to shed cells.

It is of fundamental significance that preinvasive carcinoma sheds cells which can be recognized as malignant. The greater accuracy of the cytologic method in early lesions may be due to the presence of active, healthy, malignant cells on the surface of such lesions. In gastric secretion the malignant cells often appear in groups, show hyperchromatic large nuclei with prominent nucleoli which may be vacuolated (in adenocarcinoma), and no sharp cellular borders.

Urologic Complications of Malignant Tumors of the Colon and Rectum. Giorgio Dodero, Bol. e Mem. Soc. Piemontese di Chir. **17**:376, 1947.

The urologic complications of malignant disease of the colon and rectum occur between the ages of twenty and sixty. Man is more subject to this disease than women because in the latter the genital organs lie between the rectum and bladder.

The clinical aspect of such complications depends upon pressure from the tumor itself or from the inflammatory mass due to peri-tumoral infection around the growth. Any part of the urinary tree may be involved, but more frequently the bladder is involved, giving rise to polyuria, impaired micturition, strangury and dysuria. Anatomic alterations produce partial retention, pericystitis, cystitis, or intestinal vesicle fistula.

Invasion of the prostate may simulate a primary carcinoma of that gland, although more frequently it results in periprostatitis or prostatic abscess. The higher urinary tree can be damaged either by tumors of the ascending, transverse, or descending colon as well as by tumors of the sigmoid or rectum. High urinary tract involvement may cause periureteritis, ureteritis, pyelitis, pyelonephritis, perirenal abscess, or ureteral intestinal fistula.

The prognosis of these patients depends not only on the primary carcinoma but also on the complication of renal insufficiency.

If the diagnosis of the primary malignancy is made early, not only will surgery of the primary lesion be made possible but it will also be possible to repair the damaged urinary apparatus. If the diagnosis is made late, a suprapubic cystostomy is indicated, with treatment of the suppurative process.

Surgical Castration and Synthetic Estrogens in Carcinoma of the Prostate, Mario Bonino, Bol. e Mem. Soc. Piemontese di Chir. **17**:369, 1947.

The author divided his cases of carcinoma of the prostate into two groups. The first group was treated by orchidectomy and high doses of synthetic estrogens, while the second group received estrogens alone. Good results were obtained in the first group: the masses in the prostate disappeared completely and the patients were able to urinate normally. Radiating pains disappeared and the general condition of the patient improved. Even the impotence improved, but metastases persisted.

Less evident results were obtained in the second group, even though less serious cases were treated by this method.

The author believes that in order to obtain good results the internal secretions must be suppressed and that it is unwise to depend on estrogens alone.

A New Penicillin for Prolonged Blood Levels, N. P. Sullivan, A. T. Symmes, H. C. Miller and H. W. Rhodehamel, Jr., Science, **107**:169, Feb. 13, 1948. This study, which comes from the Lilly Research Laboratories, describes the development of a sparingly soluble penicillin which may be administered in oil, oil and water emulsion or physiologic saline. This new crystalline penicillin complex was produced by chemically combining procaine with penicillin G. These crystals have a solubility of approximately 7000 units per cc. in the vehicle mentioned. They contain not less than 90 per cent penicillin G, with a potency of 940 units/mg. (1040 units/mg. theoretical). In the oil suspension at least 50 per cent of the total weight of the particles are 50 μ or more in length. The importance of particle size for the slow absorption of penicillin has been demonstrated by other workers. The present authors found that of 21 hospital patients receiving this new penicillin in cottonseed oil only one showed a blood level lower than 0.062 at the twenty-

fourth hour. Many other patients showed levels of 0.124. One patient receiving 3 cc. (900,000 units) had a therapeutic blood level at the thirty-sixth hour and a second patient receiving 4 cc. (1,200,000 units) had a blood level of 0.124 at the forty-eighth hour. In none were there local or systemic reactions. Further studies are in progress.

Practical Considerations in the Treatment of Burns, Joshua M. Deaver and Eugene P. Cronkhite, Mil. Surgeon, **102**:120, Feb. 1948. Where it is impossible to maintain sterile operating conditions, and where it is not feasible to administer sulfonamides in large amounts either orally or intravenously, it is the opinion of the authors that initial treatment of burns can best be carried out by local agents. Sulfanilamides for this purpose are best at the present time until antibiotics prove to be of more value in the future. The use of local sulfanilamides in a lanolin-cold cream base, pressure dressings and proper immobilization, permits the entire, or partial omission of cleansing and debridement and frequent changes of dressings. The bandages become quite firm and semirigid after soaking up serum and exudates, forming a satisfactory external splint. During the period of sloughing and epithelialization, dusting with sulfanilamide powder and 10 per cent calcium carbonate plus adhesive strapping and daily washing have proved of value. Blood sulfanilamide levels have not risen above 3.2 mg. per cent. This local type of burn therapy makes early skin grafting possible.

Nephrostomy in Anuria Due to Stone in an Already Nephrectomized Patient, Antonio Ruffo, Bol. e Mem. Soc. Piemontese di Chir. **17**:237, 1947. Even though anuria due to a stone in a patient with one kidney represents a serious problem, a good possibility for success exists if one intervenes early and reduces the operative trauma to a minimum. Nephrostomy should be practiced even though the obstacle, which was the primary cause of the anuria, is eliminated. The primary or mechanical factor of anuria is associated with a neuromuscular imbalance of the excretory function of the kidney. The return of the equilibrium is favored by nephrostomy.

New Treatment of Anuria, Chauvin E. (Marsiglia), Bol. e Mem. Soc. Piemontese di Chir. **17**:217, 1947.

As the cause and pathogenesis of anuria may be reflex from the paralysis of sensory innervation, or excretory from the paralysis of the pyeloureteral musculature, and secretory from paralysis of the vasomotor innervation, the author advocates the intravenous injection of novocaine and the infiltration of novocaine in the renal pelvis. In 198 cases of various types of anuria only 13 did not respond to this method of treatment. Of the 13, two were benefitted by decapsulation.

The administration of 2 to 10 cc. of a 1 per cent solution of novocaine intravenously results in a diuresis of three times the previous volume. The technic is simple: A needle 10 to 12 cm. in length is inserted dorsally with the patient sitting upright, 4 cm, from the midline and 1 cm. below the twelfth rib. The needle travels laterally to the body of the vertebra, and after piercing the muscular wall and reaching empty space, which is perirenal fat, 25 cc. of a 1 per cent novocaine solution is injected.

In Memoriam

CHARLES H. McKENNA

M.D., F.A.C.S., F.I.C.S.

The medical profession has lost one of its most valued members by the untimely death of Dr. Charles H. McKenna, who died at the age of 62 after an illness of six weeks. Dr. McKenna was born in Milbank, South Dakota, in 1885 and received his medical degree from Northwestern Medical School in 1913. His postgraduate studies took him to Wales, Scotland and France; in France he served as Chief of the Orthopedic Hospital at St. Nazaire in 1918 and 1919.

Dr. McKenna was chief of medicine and former chief of staff at Holy Cross Hospital, Chicago, and he practiced surgery for some 34 years on the south side of this city He was a fellow of the American College of Surgeons and the International College of Surgeons. He is survived by his widow and two children.

LOUIS RICHARD HAAS

M.D., F.A.C.S., F.I.C.S.

It is with deep sorrow that we announce the death of Dr. Louis Richard Haas, who died very suddenly, at the age of 44, of a heart attack while attending a patient. Dr. Haas was born in 1903 at Union City, N. J., and graduated in medicine from Cornell University Medical School in 1929. He took his postgraduate studies at Temple University in Philadelphia and Chicago Eye and Ear Hospital. After further work in New York, he went to Pittsburgh to practice as specialist in eye, ear, nose and throat diseases.

Dr Haas was a member of the Crawford County and Kansas State medical societies, the Kansas City Society of Ophthalmology and Otolaryngology, the American Medical Association, the American Academy of Ophthalmology and Otolaryngology, the American College of Surgeons, The International College of Surgeons, and a certified Member of the American Boards of Ophthalmology and Otolaryngology. He made numerous contributions to the literature of his chosen field of medicine.

Dr. Haas is survived by his widow, his father and two sisters.

COL. WILLIAM J. CARRINGTON

M.D., F.A.C.S., F.I.C.S.

Dr. William J. Carrington, 63, president in 1934 of Kiwanis International and a former vice-president of the American Medical Association, died recently after a long illness at his home in Clinton, Iowa. Until illness forced his retirement a year ago, he had been chief of surgical services in Schick General Hospital at Clinton. He served as colonel in the Army Medical Corps during World War II. He was born in Jefferson City, Mo., and graduated in medicine from the University of Missouri and the Jefferson Medical College of Philadelphia. A fellow of the American College of Surgeons and the International College of Surgeons and a leading gynecologist, he was the author of numerous articles in medical literature. Col. Carrington is survived by his widow, a son and five daughters.

JAMES ROBERT GOODALL

M.D., C.M.,D.SC., F.R.C.O.G., F.A.C.S., F.I.C.S.

Dr. James Robert Goodall, internationally famous surgeon, scientist, philosopher and linguist, died suddenly at the Montreal General Hospital after a brief illness in his 70th year. Dr. Goodall was born in Ottawa in 1877; he graduated in medicine from McGill University in 1901. After graduation

he spent four years of internship at the Royal Victoria Hospital in Montreal in medicine, surgery, obstetrics and gynecology, before proceeding to postgraduate work in London, Edinburgh, Paris and Berlin. During World War I he served with the 5th Royal Mounted Rifles overseas as Battalion medical officer in the front lines and was wounded three times during the second battle of Ypres in 1916; on three occasions he was mentioned in dispatches for service to his country.

His work in gynecology made him known throughout the world, and his contributions to the literature not only of medicine but other cultural fields were numerous and penetrating studies. His best known book is his study on Endometriosis, Endosalpingiosis, Endocervicosis and Peritoneo-Ovarian Sclerosis, a subject on which he was classed as an authority. Dr Goodall had a wide knowledge of modern literature and was an accomplished linguist, being able to converse in five different languages. Music was one of his hobbies, and in later years he became intensely interested in philosophy. He was working on a philosophical book entitled Religio Chirurgi at the time of his death and had recently presented in Toronto a paper on The History of Man's Concept of the Soul.

Dr. Goodall is survived by his widow, one son, two daughters and one brother. He leaves behind him a record of a life of single-minded devotion to suffering humanity.

WALTER BARCLAY MOUNT

M.D., F.A.C.S., F.I.C.S.

It is with sincere regret that we record the untimely passing of Dr. Walter Barclay Mount who at the age of 68 died on February 17, 1948, following a heart attack. Dr. Mount was born in New York and received his medical degree from the College of Physicians and Surgeons. He first served in the Sloane Hospital for Women and the Vanderbilt Clinic. Later he settled in the Montclair area where he was attending obstetrician of St. Vincent's Hospital of Montclair at the time of his death. Dr. Mount also served in World War I. He was active in many medical and social societies and held a number of executive offices. He was a Fellow of the American College of Surgeons, and, since 1945, of the International College of Surgeons. He was accorded Founder Fellowship recently by the latter body. He is survived by his widow, a son, three daughters, two brothers and five grandchildren.